Please send your feedbacks (for example suggestions for amendments, additions, etc.) to p.n.suganthan@qu.edu.qa

List of metaheuristics algorithms

- [1] (EP) L.J. Fogel, A.J. Owens, M.J. Walsh, Intelligent decision making through a simulation of evolution, Behav. Sci. 11 (1966) 253–272.
- [2] (ES) I. Rechenberg, Cybernetic solution path of an experimental problem, R. Aircr. Establ. Libr. Transl. 1122. (1965).
- [3] (GA) J.H. Holland, Adaptation in natural and artificial systems, univ. of mich. press, Ann Arbor. (1975).¹
- [4] (SSA) F. Glover, Heuristics for integer programming using surrogate constraints, Decis. Sci. 8 (1977) 156–166.
- [5] (GP) J.R. KOZA, Genetic programming: on the programming of computers machine learning', (1989).
- [6] (SA) S. Kirkpatrick, C.D. Gelatt, M.P. Vecchi, Optimization by simulated annealing, Science (80-.). 220 (1983) 671–680.
- [7] (TS) F. Glover, Future paths for integer programming and links to artificial intelligence, Comput. Oper. Res. 13 (1986) 533–549.
- [8] (SSN) J.M. Bishop, Stochastic searching networks, in: 1989 First IEE Int. Conf. Artif. Neural Networks, (Conf. Publ. No. 313), IET, 1989: pp. 329–331.
- [9] (MA) P. Moscato, On evolution, search, optimization, genetic algorithms and martial arts: Towards memetic algorithms, Caltech Concurr. Comput. Program, C3P Rep. 826 (1989) 1989.
- [10] (ACO) M. Dorigo, Optimization, learning and natural algorithms, Ph. D. Thesis, Politec. Di Milano. (1992).
- [11] (SCE) Q.Y. Duan, V.K. Gupta, S. Sorooshian, Shuffled complex evolution approach for effective and efficient global minimization, J. Optim. Theory Appl. 76 (1993) 501–521.
- [12] (GDA) G. Dueck, New optimization heuristics: The great deluge algorithm and the record-to-record travel, J. Comput. Phys. 104 (1993) 86–92.
- [13] (CA) R.G. Reynolds, An introduction to cultural algorithms, in: Proc. Third Annu. Conf. Evol. Program., World Scientific, 1994: pp. 131–139.
- [14] (DE) R. Storn, K. Price, Differential evolution—a simple and efficient heuristic for global optimization over continuous spaces, J. Glob. Optim. 11 (1997) 341–359.
- [15] (PSO) R. Eberhart, J. Kennedy, A new optimizer using particle swarm theory, in: MHS'95. Proc. Sixth Int. Symp. Micro Mach. Hum. Sci., Ieee, 1995: pp. 39–43.
- [16] (OBA) T.C. Hu, A.B. Kahng, C.-W.A. Tsao, Old bachelor acceptance: A new class of non-monotone threshold accepting methods, ORSA J. Comput. 7 (1995) 417–425.
- [17] (BEA) C. Numaoka, Bacterial evolution algorithm for rapid adaptation, in: Eur. Work. Model. Auton. Agents a Multi-Agent World, Springer, 1996: pp. 139–148.
- [18] (VND) N. Mladenović, P. Hansen, Variable neighborhood search, Comput. Oper. Res. 24 (1997)

¹ The first record of the proposal to evolve programs is probably that of Alan Turing in 1950^[1]. In 1981, Richard Forsyth demonstrated the successful evolution of small programs, represented as trees, to perform classification of crime scene evidence for the UK Home Office^[2]. (https://en.wikipedia.org/wiki/Genetic_programming)

- 1097-1100.
- [19] (BSI) T. Sato, M. Hagiwara, Bee system: finding solution by a concentrated search, IEEJ Trans. Electron. Inf. Syst. 118 (1998) 721–726.
- [20] (PLA) H. Murase, A. Wadano, Photosynthetic algorithm for machine learning and TSP, IFAC Proc. Vol. 31 (1998) 19–24.
- [21] (COA) B.L.I.W. JIANG, Optimizing complex functions by chaos search, Cybern. Syst. 29 (1998) 409–419.
- [22] (SFHD) K. Nara, T. Takeyama, H. Kim, A new evolutionary algorithm based on sheep flocks heredity model and its application to scheduling problem, in: IEEE SMC'99 Conf. Proceedings. 1999 IEEE Int. Conf. Syst. Man, Cybern. (Cat. No. 99CH37028), IEEE, 1999: pp. 503–508.
- [23] (EO) S. Boettcher, A.G. Percus, Extremal optimization: Methods derived from co-evolution, ArXiv Prepr. Math/9904056. (1999).
- [24] (GCA) S. Kundu, Gravitational clustering: a new approach based on the spatial distribution of the points, Pattern Recognit. 32 (1999) 1149–1160.
- [25] (CSA) L.N. De Castro, F.J. Von Zuben, The clonal selection algorithm with engineering applications, in: Proc. GECCO, 2000: pp. 36–39.
- [26] (HSA) Z.W. Geem, J.H. Kim, G.V. Loganathan, A new heuristic optimization algorithm: harmony search, Simulation. 76 (2001) 60–68.
- [27] (GEP) C. Ferreira, Gene expression programming: a new adaptive algorithm for solving problems, ArXiv Prepr. Cs/0102027. (2001).
- [28] (MBO) H.A. Abbass, MBO: Marriage in honey bees optimization-A haplometrosis polygynous swarming approach, in: Proc. 2001 Congr. Evol. Comput. (IEEE Cat. No. 01TH8546), IEEE, 2001: pp. 207–214.
- [29] (MFA) K.M. Passino, Biomimicry of bacterial foraging for distributed optimization and control, IEEE Control Syst. Mag. 22 (2002) 52–67.
- [30] (BCA) S.D. Muller, J. Marchetto, S. Airaghi, P. Kournoutsakos, Optimization based on bacterial chemotaxis, IEEE Trans. Evol. Comput. 6 (2002) 16–29.
- [31] (BS2) P. Lucic, D. Teodorovic, Transportation modeling: an artificial life approach, in: 14th IEEE Int. Conf. Tools with Artif. Intell. 2002.(ICTAI 2002). Proceedings., IEEE, 2002: pp. 216–223.
- [32] (POPMUSIC) É.D. Taillard, S. Voss, POPMUSIC—Partial optimization metaheuristic under special intensification conditions, in: Essays Surv. Metaheuristics, Springer, 2002: pp. 613–629.
- [33] (SCO) X.-F. Xie, W.-J. Zhang, Z.-L. Yang, Social cognitive optimization for nonlinear programming problems, in: Proceedings. Int. Conf. Mach. Learn. Cybern., IEEE, 2002: pp. 779–783.
- [34] (AFSA) X.L. Li, J.X. Qian, Studies on artificial fish swarm optimization algorithm based on decomposition and coordination techniques, J. Circuits Syst. 1 (2003) 1–6.
- [35] (CMA-ES) N. Hansen, S.D. Müller, P. Koumoutsakos, Reducing the time complexity of the derandomized evolution strategy with covariance matrix adaptation (CMA-ES), Evol. Comput. 11 (2003) 1–18.
- [36] (SC) T. Ray, K.-M. Liew, Society and civilization: an optimization algorithm based on the simulation of social behavior, IEEE Trans. Evol. Comput. 7 (2003) 386–396.
- [37] (AIS) D. Dasgupta, Z. Ji, F. Gonzalez, Artificial immune system (AIS) research in the last five years, in: 2003 Congr. Evol. Comput. 2003. CEC'03., IEEE, 2003: pp. 123–130.

- [38] (QBE) S.H. Jung, Queen-bee evolution for genetic algorithms, Electron. Lett. 39 (2003) 575–576.
- [39] (EMO) Ş.İ. Birbil, S.-C. Fang, An electromagnetism-like mechanism for global optimization, J. Glob. Optim. 25 (2003) 263–282.
- [40] (BHA) H.F. Wedde, M. Farooq, Y. Zhang, Beehive: An efficient fault-tolerant routing algorithm inspired by honey bee behavior, in: Int. Work. Ant Colony Optim. Swarm Intell., Springer, 2004: pp. 83–94.
- [41] (SOMA) I. Zelinka, SOMA—self-organizing migrating algorithm, in: New Optim. Tech. Eng., Springer, 2004: pp. 167–217.
- [42] (ABCA) D. Karaboga, An idea based on honey bee swarm for numerical optimization, Technical report-tr06, Erciyes university, engineering faculty, computer ..., 2005.
- [43] (BCO) D. Teodorovic, M. Dell'Orco, Bee colony optimization—a cooperative learning approach to complex transportation problems, Adv. OR AI Methods Transp. 51 (2005) 60.
- [44] (BSOA) H. Drias, S. Sadeg, S. Yahi, Cooperative bees swarm for solving the maximum weighted satisfiability problem, in: Int. Work. Artif. Neural Networks, Springer, 2005: pp. 318–325.
- [45] (DCA) J. Greensmith, U. Aickelin, S. Cayzer, Introducing dendritic cells as a novel immune-inspired algorithm for anomaly detection, in: Int. Conf. Artif. Immune Syst., Springer, 2005: pp. 153–167.
- [46] (BA) D.T. Pham, A. Ghanbarzadeh, E. Koç, S. Otri, S. Rahim, M. Zaidi, The bees algorithm—a novel tool for complex optimisation problems, in: Intell. Prod. Mach. Syst., Elsevier, 2006: pp. 454–459.
- [47] (WSO) P. Pinto, T.A. Runkler, J.M. Sousa, Wasp swarm optimization of logistic systems, in: Adapt. Nat. Comput. Algorithms, Springer, 2005: pp. 264–267.
- [48] (SFLA) M. Eusuff, K. Lansey, F. Pasha, Shuffled frog-leaping algorithm: a memetic meta-heuristic for discrete optimization, Eng. Optim. 38 (2006) 129–154.
- [49] (BBC) O.K. Erol, I. Eksin, A new optimization method: big bang-big crunch, Adv. Eng. Softw. 37 (2006) 106-111.
- [50] (CSO) S.-C. Chu, P.-W. Tsai, J.-S. Pan, Cat swarm optimization, in: Pacific Rim Int. Conf. Artif. Intell., Springer, 2006: pp. 854–858.
- [51] (FA) X. Cui, J. Gao, T.E. Potok, A flocking based algorithm for document clustering analysis, J. Syst. Archit. 52 (2006) 505–515.
- [52] (HBMO) O.B. Haddad, A. Afshar, M.A. Marino, Honey-bees mating optimization (HBMO) algorithm: a new heuristic approach for water resources optimization, Water Resour. Manag. 20 (2006) 661–680.
- [53] (SWOA) H. Du, X. Wu, J. Zhuang, Small-world optimization algorithm for function optimization, in: Int. Conf. Nat. Comput., Springer, 2006: pp. 264–273.
- [54] (SGUA) A. Karci, B. Alatas, Thinking capability of saplings growing up algorithm, in: Int. Conf. Intell. Data Eng. Autom. Learn., Springer, 2006: pp. 386–393.
- [55] (SOA) C. Dai, Y. Zhu, W. Chen, Seeker optimization algorithm, in: Int. Conf. Comput. Inf. Sci., Springer, 2006: pp. 167–176.
- [56] (WCO) A.R. Mehrabian, C. Lucas, A novel numerical optimization algorithm inspired from weed colonization, Ecol. Inform. 1 (2006) 355–366.
- [57] (ICA) E. Atashpaz-Gargari, C. Lucas, Imperialist competitive algorithm: An algorithm for optimization inspired by imperialistic competition, in: 2007 IEEE Congr. Evol. Comput., 2007: pp. 4661–4667. https://doi.org/10.1109/CEC.2007.4425083.

- [58] (MSA) A. Mucherino, O. Seref, Monkey search: a novel metaheuristic search for global optimization, in: AIP Conf. Proc., American Institute of Physics, 2007: pp. 162–173.
- [59] (RFD) P. Rabanal, I. Rodríguez, F. Rubio, Using river formation dynamics to design heuristic algorithms, in: Int. Conf. Unconv. Comput., Springer, 2007: pp. 163–177.
- [60] (BSA) W.J. Tang, Q.H. Wu, J.R. Saunders, A bacterial swarming algorithm for global optimization, in: 2007 IEEE Congr. Evol. Comput., IEEE, 2007: pp. 1207–1212.
- [61] (BF) T.-C. Chen, P.-W. Tsai, S.-C. Chu, J.-S. Pan, A novel optimization approach: bacterial-GA foraging, in: Second Int. Conf. Innov. Comput. Informatio Control (ICICIC 2007), IEEE, 2007: p. 391.
- [62] (POA) A. Borji, A new global optimization algorithm inspired by parliamentary political competitions, in: Mex. Int. Conf. Artif. Intell., Springer, 2007: pp. 61–71.
- [63] (SA) J.P. Pedroso, Simple metaheuristics using the simplex algorithm for non-linear programming, in: Int. Work. Eng. Stoch. Local Search Algorithms, Springer, 2007: pp. 217–221.
- [64] (GLSA) S. Su, J. Wang, W. Fan, X. Yin, Good lattice swarm algorithm for constrained engineering design optimization, in: 2007 Int. Conf. Wirel. Commun. Netw. Mob. Comput., IEEE, 2007: pp. 6421–6424.
- [65] (CFO) R.A. Formato, Central force optimization, Prog Electromagn Res. 77 (2007) 425-491.
- [66] (FBSA) Y. Chu, H. Mi, H. Liao, Z. Ji, Q.H. Wu, A fast bacterial swarming algorithm for high-dimensional function optimization, in: 2008 IEEE Congr. Evol. Comput. (Ieee World Congr. Comput. Intell., IEEE, 2008: pp. 3135–3140.
- [67] (BBO) D. Simon, Biogeography-based optimization, IEEE Trans. Evol. Comput. 12 (2008) 702–713.
- [68] (BS) E. Del Acebo, J.L. de-la Rosa, Introducing bar systems: a class of swarm intelligence optimization algorithms, in: AISB 2008 Conv. Commun. Interact. Soc. Intell., 2008: p. 18.
- [69] (CatfishPSO) L.-Y. Chuang, S.-W. Tsai, C.-H. Yang, Catfish particle swarm optimization, in: 2008 IEEE Swarm Intell. Symp., IEEE, 2008: pp. 1–5.
- [70] (GTO) J. Wang, D. Wang, Particle swarm optimization with a leader and followers, Prog. Nat. Sci. 18 (2008) 1437–1443.
- [71] (HEA) Y.H. Cui, R. Guo, R. V Rao, V.J. Savsani, Harmony element algorithm: A naive initial searching range, in: Int. Conf. Adv. Mech. Eng., 2008: pp. 1–6.
- [72] (FSF) C.J.A. Bastos Filho, F.B. de Lima Neto, A.J.C.C. Lins, A.I.S. Nascimento, M.P. Lima, A novel search algorithm based on fish school behavior, in: 2008 IEEE Int. Conf. Syst. Man Cybern., IEEE, 2008: pp. 2646–2651.
- [73] (RIO) T.C. Havens, C.J. Spain, N.G. Salmon, J.M. Keller, Roach infestation optimization, in: 2008 IEEE Swarm Intell. Symp., IEEE, 2008: pp. 1–7.
- [74] (VS) P. Cortés, J.M. García, J. Muñuzuri, L. Onieva, Viral systems: A new bio-inspired optimisation approach, Comput. Oper. Res. 35 (2008) 2840–2860.
- [75] (PGO) W. Cai, W. Yang, X. Chen, A global optimization algorithm based on plant growth theory: plant growth optimization, in: 2008 Int. Conf. Intell. Comput. Technol. Autom., IEEE, 2008: pp. 1194–1199.
- [76] (ABA) M.A. Munoz, J.A. López, E. Caicedo, An artificial beehive algorithm for continuous optimization, Int. J. Intell. Syst. 24 (2009) 1080–1093.
- [77] (APO) L. Xie, J. Zeng, Z. Cui, General framework of artificial physics optimization algorithm, in: 2009 World Congr. Nat. Biol. Inspired Comput., IEEE, 2009: pp. 1321–1326.

- [78] (BCiA) S. Häckel, P. Dippold, The bee colony-inspired algorithm (BCiA) a two-stage approach for solving the vehicle routing problem with time windows, in: Proc. 11th Annu. Conf. Genet. Evol. Comput., 2009: pp. 25–32.
- [79] (GELS) B. Barzegar, A.M. Rahmani, K. Zamanifar, A. Divsalar, Gravitational emulation local search algorithm for advanced reservation and scheduling in grid computing systems, in: 2009 Fourth Int. Conf. Comput. Sci. Converg. Inf. Technol., IEEE, 2009: pp. 1240–1245.
- [80] (GBO) S. He, Q.H. Wu, J.R. Saunders, Group search optimizer: an optimization algorithm inspired by animal searching behavior, IEEE Trans. Evol. Comput. 13 (2009) 973–990.
- [81] (CS) X.-S. Yang, S. Deb, Cuckoo search via Lévy flights, in: 2009 World Congr. Nat. Biol. Inspired Comput., Ieee, 2009: pp. 210–214.
- [82] (GSA) E. Rashedi, H. Nezamabadi-pour, S. Saryazdi, GSA: A Gravitational Search Algorithm, Inf. Sci. (Ny). 179 (2009) 2232–2248. https://doi.org/10.1016/j.ins.2009.03.004.
- [83] (FA) X.-S. Yang, Firefly algorithms for multimodal optimization, in: Int. Symp. Stoch. Algorithms, Springer, 2009: pp. 169–178.
- [84] (FCA) A. Mutazono, M. Sugano, M. Murata, Frog call-inspired self-organizing anti-phase synchronization for wireless sensor networks, in: 2009 2nd Int. Work. Nonlinear Dyn. Synchronization, IEEE, 2009: pp. 81–88.
- [85] (GSO) K.N. Krishnanand, D. Ghose, Glowworm swarm optimization for simultaneous capture of multiple local optima of multimodal functions, Swarm Intell. 3 (2009) 87–124.
- [86] (LCA) A.H. Kashan, League championship algorithm: a new algorithm for numerical function optimization, in: 2009 Int. Conf. Soft Comput. Pattern Recognit., IEEE, 2009: pp. 43–48.
- [87] (PFA) U. Premaratne, J. Samarabandu, T. Sidhu, A new biologically inspired optimization algorithm, in: 2009 Int. Conf. Ind. Inf. Syst., IEEE, 2009: pp. 279–284.
- [88] (DPO) Y. Shiqin, J. Jianjun, Y. Guangxing, A dolphin partner optimization, in: 2009 WRI Glob. Congr. Intell. Syst., IEEE, 2009: pp. 124–128.
- [89] (DS) S. Kadioglu, M. Sellmann, Dialectic search, in: Int. Conf. Princ. Pract. Constraint Program., Springer, 2009: pp. 486–500.
- [90] (HIA) L.M. Zhang, C. Dahlmann, Y. Zhang, Human-inspired algorithms for continuous function optimization, in: 2009 IEEE Int. Conf. Intell. Comput. Intell. Syst., IEEE, 2009: pp. 318–321.
- [91] (ASSA) T. Chen, A simulative bionic intelligent optimization algorithm: artificial searching swarm algorithm and its performance analysis, in: 2009 Int. Jt. Conf. Comput. Sci. Optim., IEEE, 2009: pp. 864–866.
- [92] (BBMO) F. Comellas, J. Martinez-Navarro, Bumblebees: a multiagent combinatorial optimization algorithm inspired by social insect behaviour, in: Proc. First ACM/SIGEVO Summit Genet. Evol. Comput., 2009: pp. 811–814.
- [93] (GCO) M.A. Eita, M.M. Fahmy, Group counseling optimization: a novel approach, in: Res. Dev. Intell. Syst. XXVI, Springer, 2010: pp. 195–208.
- [94] (HSA) R. Oftadeh, M.J. Mahjoob, A new meta-heuristic optimization algorithm: Hunting Search, in: 2009 Fifth Int. Conf. Soft Comput. Comput. with Words Perceptions Syst. Anal. Decis. Control, IEEE, 2009: pp. 1–5.
- [95] (LS) S. Chen, Locust Swarms-A new multi-optima search technique, in: 2009 IEEE Congr. Evol. Comput., IEEE, 2009: pp. 1745–1752.
- [96] (IWDA) H. Shah-Hosseini, The intelligent water drops algorithm: a nature-inspired swarm-based optimization algorithm, Int. J. Bio-Inspired Comput. 1 (2009) 71–79.

- [97] (WFA) T.T. Hieu, N.K. Ming, A Water Flow Algorithm for Flexible Flow Shop Scheduling with Limited Intermediate Buffers, (2009).
- [98] (ARO) A. Farasat, M.B. Menhaj, T. Mansouri, M.R.S. Moghadam, ARO: A new model-free optimization algorithm inspired from asexual reproduction, Appl. Soft Comput. 10 (2010) 1284–1292.
- [99] (BOA) X. Zhang, B. Sun, T. Mei, R. Wang, Post-disaster restoration based on fuzzy preference relation and bean optimization algorithm, in: 2010 IEEE Youth Conf. Information, Comput. Telecommun., IEEE, 2010: pp. 271–274.
- [100] (BA) X.-S. Yang, A new metaheuristic bat-inspired algorithm, in: Nat. Inspired Coop. Strateg. Optim. (NICSO 2010), Springer, 2010: pp. 65–74.
- [101] (BSO) R. Akbari, A. Mohammadi, K. Ziarati, A novel bee swarm optimization algorithm for numerical function optimization, Commun. Nonlinear Sci. Numer. Simul. 15 (2010) 3142–3155. https://doi.org/10.1016/j.cnsns.2009.11.003.
- [102] (CSS) A. Kaveh, S. Talatahari, A novel heuristic optimization method: charged system search, Acta Mech. 213 (2010) 267–289. https://doi.org/10.1007/s00707-009-0270-4.
- [103] (CRO) J. Xu, A.Y.S. Lam, V.O.K. Li, Chemical reaction optimization for the grid scheduling problem, in: 2010 IEEE Int. Conf. Commun., IEEE, 2010: pp. 1–5.
- [104] (GFA) M. Zheng, G. Liu, C. Zhou, Y. Liang, Y. Wang, Gravitation field algorithm and its application in gene cluster, Algorithms Mol. Biol. 5 (2010) 1–11.
- [105] (FA) Y. Tan, Y. Zhu, Fireworks algorithm for optimization, in: Int. Conf. Swarm Intell., Springer, 2010: pp. 355–364.
- [106] (ES) X.-S. Yang, S. Deb, Eagle strategy using Lévy walk and firefly algorithms for stochastic optimization, in: Nat. Inspired Coop. Strateg. Optim. (NICSO 2010), Springer, 2010: pp. 101–111.
- [107] (GEA) A. Ahrari, A.A. Atai, Grenade explosion method—a novel tool for optimization of multimodal functions, Appl. Soft Comput. 10 (2010) 1132–1140.
- [108] (WDO) Z. Bayraktar, M. Komurcu, D.H. Werner, Wind Driven Optimization (WDO): A novel nature-inspired optimization algorithm and its application to electromagnetics, in: 2010 IEEE Antennas Propag. Soc. Int. Symp., IEEE, 2010: pp. 1–4.
- [109] (TCO) R. Hedayatzadeh, F.A. Salmassi, M. Keshtgari, R. Akbari, K. Ziarati, Termite colony optimization: A novel approach for optimizing continuous problems, in: 2010 18th Iran. Conf. Electr. Eng., IEEE, 2010: pp. 553–558.
- [110] (CGS) S. Iordache, Consultant-guided search: a new metaheuristic for combinatorial optimization problems, in: Proc. 12th Annu. Conf. Genet. Evol. Comput., 2010: pp. 225–232.
- [111] (SEOA) Y. Xu, Z. Cui, J. Zeng, Social emotional optimization algorithm for nonlinear constrained optimization problems, in: Int. Conf. Swarm, Evol. Memetic Comput., Springer, 2010: pp. 583–590.
- [112] (HSM) H. Chen, Y. Zhu, K. Hu, X. He, Hierarchical swarm model: a new approach to optimization, Discret. Dyn. Nat. Soc. 2010 (2010).
- [113] (RA) A. Sharma, A new optimizing algorithm using reincarnation concept, in: 2010 11th Int. Symp. Comput. Intell. Informatics, IEEE, 2010: pp. 281–288.
- [114] (APO) Z. Zhao, Z. Cui, J. Zeng, X. Yue, Artificial plant optimization algorithm for constrained optimization problems, in: 2011 Second Int. Conf. Innov. Bio-Inspired Comput. Appl., IEEE, 2011: pp. 120–123.

- [115] (BSO) Y. Shi, Brain storm optimization algorithm, in: Int. Conf. Swarm Intell., Springer, 2011: pp. 303–309.
- [116] (BSOA) D.R. de Oliveira, R.S. Parpinelli, H.S. Lopes, Bioluminescent swarm optimization algorithm, in: Evol. Algorithms, IntechOpen, 2011.
- [117] (CSO) Z. Chen, A modified cockroach swarm optimization, Energy Procedia. (2011) 4–9.
- [118] (GEB) H. Min, Z. Wang, Design and analysis of group escape behavior for distributed autonomous mobile robots, in: 2011 IEEE Int. Conf. Robot. Autom., IEEE, 2011: pp. 6128–6135.
- [119] (GIOA) A. Daskin, S. Kais, Group leaders optimization algorithm, Mol. Phys. 109 (2011) 761–772.
- [120] (TLBO) R. V Rao, V.J. Savsani, D.P. Vakharia, Teaching-learning-based optimization: A novel method for constrained mechanical design optimization problems, Comput. Des. 43 (2011) 303–315. https://doi.org/https://doi.org/10.1016/j.cad.2010.12.015.
- [121] (COA) R. Rajabioun, Cuckoo Optimization Algorithm, Appl. Soft Comput. 11 (2011) 5508–5518. https://doi.org/10.1016/j.asoc.2011.05.008.
- [122] (ACROA) B. Alatas, ACROA: artificial chemical reaction optimization algorithm for global optimization, Expert Syst. Appl. 38 (2011) 13170–13180.
- [123] (GBSA) H. Shah-Hosseini, Principal components analysis by the galaxy-based search algorithm: a novel metaheuristic for continuous optimisation, Int. J. Comput. Sci. Eng. 6 (2011) 132–140.
- [124] (SDIO) K. Tamura, K. Yasuda, Spiral dynamics inspired optimization, J. Adv. Comput. Intell. Intell. Informatics. 15 (2011) 1116–1122.
- [125] (PPA) A. Salhi, E.S. Fraga, Nature-inspired optimisation approaches and the new plant propagation algorithm, (2011).
- [126] (EIEA) R.S. Parpinelli, H.S. Lopes, An eco-inspired evolutionary algorithm applied to numerical optimization, in: 2011 Third World Congr. Nat. Biol. Inspired Comput., IEEE, 2011: pp. 466–471.
- [127] (GIO) J.J. Flores, R. López, J. Barrera, Gravitational interactions optimization, in: Int. Conf. Learn. Intell. Optim., Springer, 2011: pp. 226–237.
- [128] (SCA) M. Taherdangkoo, M. Yazdi, M.H. Bagheri, Stem cells optimization algorithm, in: Int. Conf. Intell. Comput., Springer, 2011: pp. 394–403.
- [129] (WFA) T.H. Tran, K.M. Ng, A water-flow algorithm for flexible flow shop scheduling with intermediate buffers, J. Sched. 14 (2011) 483–500.
- [130] (ASO) A. Ahmadi-Javid, Anarchic Society Optimization: A human-inspired method, in: 2011 IEEE Congr. Evol. Comput., IEEE, 2011: pp. 2586–2592.
- [131] (ATA) T. Chen, Y. Wang, J. Li, Artificial Tribe Algorithm and Its Performance Analysis., J. Softw. 7 (2012) 651–656.
- [132] (BI) B. Malakooti, H. Kim, S. Sheikh, Bat intelligence search with application to multi-objective multiprocessor scheduling optimization, Int. J. Adv. Manuf. Technol. 60 (2012) 1071–1086.
- [133] (CAB) E. Cuevas, M. Gonzalez, D. Zaldivar, M. Perez-Cisneros, G. García, An algorithm for global optimization inspired by collective animal behavior, Discret. Dyn. Nat. Soc. 2012 (2012).
- [134] (CMDE) C. Zhu, J. Ni, Cloud model-based differential evolution algorithm for optimization problems, in: 2012 Sixth Int. Conf. Internet Comput. Sci. Eng., IEEE, 2012: pp. 55–59.
- [135] (FPA) X.-S. Yang, Flower pollination algorithm for global optimization, in: Int. Conf. Unconv.

- Comput. Nat. Comput., Springer, 2012: pp. 240–249.
- [136] (FL) A. Bellaachia, A. Bari, Flock by leader: a novel machine learning biologically inspired clustering algorithm, in: Int. Conf. Swarm Intell., Springer, 2012: pp. 117–126.
- [137] (KHA) A.H. Gandomi, A.H. Alavi, Krill herd: a new bio-inspired optimization algorithm, Commun. Nonlinear Sci. Numer. Simul. 17 (2012) 4831–4845.
- [138] (FFOA) W.-T. Pan, A new fruit fly optimization algorithm: taking the financial distress model as an example, Knowledge-Based Syst. 26 (2012) 69–74.
- [139] (WCA) H. Eskandar, A. Sadollah, A. Bahreininejad, M. Hamdi, Water cycle algorithm—A novel metaheuristic optimization method for solving constrained engineering optimization problems, Comput. Struct. 110 (2012) 151–166.
- [140] (DSA) P. Civicioglu, Transforming geocentric cartesian coordinates to geodetic coordinates by using differential search algorithm, Comput. Geosci. 46 (2012) 229–247.
- [141] (RO) A. Kaveh, M. Khayatazad, A new meta-heuristic method: Ray Optimization, Comput. Struct. 112–113 (2012) 283–294. https://doi.org/10.1016/j.compstruc.2012.09.003.
- [142] (MBO) E. Duman, M. Uysal, A.F. Alkaya, Migrating birds optimization: a new metaheuristic approach and its performance on quadratic assignment problem, Inf. Sci. (Ny). 217 (2012) 65–77.
- [143] (WSA) R. Tang, S. Fong, X.-S. Yang, S. Deb, Wolf search algorithm with ephemeral memory, in: Seventh Int. Conf. Digit. Inf. Manag. (ICDIM 2012), IEEE, 2012: pp. 165–172.
- [144] (MBA) A. Sadollah, A. Bahreininejad, H. Eskandar, M. Hamdi, Mine blast algorithm for optimization of truss structures with discrete variables, Comput. Struct. 102 (2012) 49–63.
- [145] (EMO) E. Cuevas, D. Oliva, D. Zaldivar, M. Pérez-Cisneros, H. Sossa, Circle detection using electro-magnetism optimization, Inf. Sci. (Ny). 182 (2012) 40–55. https://doi.org/10.1016/j.ins.2010.12.024.
- [146] (BCO) B. Niu, H. Wang, Bacterial colony optimization, Discret. Dyn. Nat. Soc. 2012 (2012).
- [147] (GSR) A. Mozaffari, A. Fathi, S. Behzadipour, The great salmon run: a novel bio-inspired algorithm for artificial system design and optimisation, Int. J. Bio-Inspired Comput. 4 (2012) 286–301.
- [148] (JTFC) H. Hernández, C. Blum, Distributed graph coloring: an approach based on the calling behavior of Japanese tree frogs, Swarm Intell. 6 (2012) 117–150.
- [149] (CSO) A. Milani, V. Santucci, Community of scientist optimization: An autonomy oriented approach to distributed optimization, AI Commun. 25 (2012) 157–172.
- [150] (QBSO) J. Cao, H. Gao, A quantum-inspired bacterial swarming optimization algorithm for discrete optimization problems, in: Int. Conf. Swarm Intell., Springer, 2012: pp. 29–36.
- [151] (HH) M. El-Dosuky, A. El-Bassiouny, T. Hamza, M. Rashad, New hoopoe heuristic optimization, ArXiv Prepr. ArXiv1211.6410. (2012).
- [152] (IGSA) H. Askari, S.-H. Zahiri, Intelligent gravitational search algorithm for optimum design of fuzzy classifier, in: 2012 2nd Int. EConference Comput. Knowl. Eng., IEEE, 2012: pp. 98–104.
- [153] (LPO) B. Wang, X. Jin, B. Cheng, Lion pride optimizer: An optimization algorithm inspired by lion pride behavior, Sci. China Inf. Sci. 55 (2012) 2369–2389.
- [154] (MFA) H.T. Nguyen, B. Bhanu, Zombie Survival Optimization: A swarm intelligence algorithm inspired by zombie foraging, in: Proc. 21st Int. Conf. Pattern Recognit., IEEE, 2012: pp. 987–990.
- [155] (APPM) X. Cai, Wireless sensor network coverage problem with artificial photosynthesis and

- phototropism mechanism, Sens. Lett. 10 (2012) 1653–1658.
- [156] (SA) C. Anandaraman, A.V.M. Sankar, R. Natarajan, A new evolutionary algorithm based on bacterial evolution and its application for scheduling a flexible manufacturing system, J. Tek. Ind. 14 (2012) 1–12.
- [157] (APOA) Z. Cui, X. Cai, Artificial plant optimization algorithm, in: Swarm Intell. Bio-Inspired Comput., Elsevier, 2013: pp. 351–365.
- [158] (ARA) P. Melin, L. Astudillo, O. Castillo, F. Valdez, M. Garcia, Optimal design of type-2 and type-1 fuzzy tracking controllers for autonomous mobile robots under perturbed torques using a new chemical optimization paradigm, Expert Syst. Appl. 40 (2013) 3185–3195.
- [159] (ASBO) M.K. Singh, A new optimization method based on adaptive social behavior: ASBO, in: Proc. Int. Conf. Adv. Comput., Springer, 2013: pp. 823–831.
- [160] (BI) O. Hasançebi, T. Teke, O. Pekcan, A bat-inspired algorithm for structural optimization, Comput. Struct. 128 (2013) 77–90.
- [161] (COBRA) S. Akhmedova, E. Semenkin, Co-operation of biology related algorithms, in: 2013 IEEE Congr. Evol. Comput., IEEE, 2013: pp. 2207–2214.
- [162] (GNA) A. Alazzam, H.W. Lewis, A new optimization algorithm for combinatorial problems, IJARAI) Int. J. Adv. Res. Artif. Intell. 2 (2013).
- [163] (MHSA) X. Feng, F.C.M. Lau, H. Yu, A novel bio-inspired approach based on the behavior of mosquitoes, Inf. Sci. (Ny). 233 (2013) 87–108.
- [164] (MAT) K. Manjappa, R.M.R. Guddeti, Mobility aware-termite: a novel bio inspired routing protocol for mobile ad-hoc networks, IET Networks. 2 (2013) 188–195.
- [165] (BSO) P. Civicioglu, Backtracking search optimization algorithm for numerical optimization problems, Appl. Math. Comput. 219 (2013) 8121–8144.
- [166] (BHA) A. Hatamlou, Black hole: A new heuristic optimization approach for data clustering, Inf. Sci. (Ny). 222 (2013) 175–184.
- [167] (SSO) E. Cuevas, M. Cienfuegos, D. Zaldívar, M. Pérez-Cisneros, A swarm optimization algorithm inspired in the behavior of the social-spider, Expert Syst. Appl. 40 (2013) 6374–6384. https://doi.org/10.1016/j.eswa.2013.05.041.
- [168] (DE) A. Kaveh, N. Farhoudi, A new optimization method: Dolphin echolocation, Adv. Eng. Softw. 59 (2013) 53–70. https://doi.org/10.1016/j.advengsoft.2013.03.004.
- [169] (ACS) P. Civicioglu, Artificial cooperative search algorithm for numerical optimization problems, Inf. Sci. (Ny). 229 (2013) 58–76.
- [170] (GBMO) M. Abdechiri, M.R. Meybodi, H. Bahrami, Gases Brownian motion optimization: an algorithm for optimization (GBMO), Appl. Soft Comput. 13 (2013) 2932–2946.
- [171] (SSOA) M. Neshat, G. Sepidnam, M. Sargolzaei, Swallow swarm optimization algorithm: a new method to optimization, Neural Comput. Appl. 23 (2013) 429–454.
- [172] (PSOA) Y. Gheraibia, A. Moussaoui, Penguins search optimization algorithm (PeSOA), in: Int. Conf. Ind. Eng. Other Appl. Appl. Intell. Syst., Springer, 2013: pp. 222–231.
- [173] (EVO) C. Sur, S. Sharma, A. Shukla, Egyptian vulture optimization algorithm—a new nature inspired meta-heuristics for knapsack problem, in: 9th Int. Conf. Comput. InformationTechnology, Springer, 2013: pp. 227–237.
- [174] (ACMO) G.-W. Yan, Z.-J. Hao, A novel optimization algorithm based on atmosphere clouds model, Int. J. Comput. Intell. Appl. 12 (2013) 1350002.
- [175] (MBOA) H. Mo, L. Xu, Magnetotactic bacteria optimization algorithm for multimodal

- optimization, in: 2013 IEEE Symp. Swarm Intell., IEEE, 2013: pp. 240-247.
- [176] (BNMR) M. Taherdangkoo, M.H. Shirzadi, M. Yazdi, M.H. Bagheri, A robust clustering method based on blind, naked mole-rats (BNMR) algorithm, Swarm Evol. Comput. 10 (2013) 1–11.
- [177] (SGO) H.D. Purnomo, H.-M. Wee, Soccer game optimization: an innovative integration of evolutionary algorithm and swarm intelligence algorithm, in: Meta-Heuristics Optim. Algorithms Eng. Business, Econ. Financ., IGI Global, 2013: pp. 386–420.
- [178] (SSLO) P. Wang, Z. Zhu, S. Huang, Seven-spot ladybird optimization: a novel and efficient metaheuristic algorithm for numerical optimization, Sci. World J. 2013 (2013).
- [179] (CA) A.S. Eesa, A.M.A. Brifcani, Z. Orman, Cuttlefish algorithm-a novel bio-inspired optimization algorithm, Int. J. Sci. Eng. Res. 4 (2013) 1978–1986.
- [180] (AWDA) C. Subramanian, A.S.S. Sekar, K. Subramanian, A new engineering optimization method: African wild dog algorithm, Int. J. Soft Comput. 8 (2013) 163–170.
- [181] (MWO) J. An, Q. Kang, L. Wang, Q. Wu, Mussels wandering optimization: an ecologically inspired algorithm for global optimization, Cognit. Comput. 5 (2013) 188–199.
- [182] (SIMB) S.S. Pattnaik, K.M. Bakwad, B.S. Sohi, R.K. Ratho, S. Devi, Swine influenza models based optimization (SIMBO), Appl. Soft Comput. 13 (2013) 628–653.
- [183] (TPO) A.H. Halim, I. Ismail, Nonlinear plant modeling using neuro-fuzzy system with Tree Physiology Optimization, in: 2013 IEEE Student Conf. Res. Dev., IEEE, 2013: pp. 295–300.
- [184] (ABH) B. Naderi, M. Khalili, A.A. Khamseh, Mathematical models and a hunting search algorithm for the no-wait flowshop scheduling with parallel machines, Int. J. Prod. Res. 52 (2014) 2667–2681.
- [185] (ARA) Q. Jiang, L. Wang, X. Hei, R. Fei, D. Yang, F. Zou, H. Li, Z. Cao, Y. Lin, Optimal approximation of stable linear systems with a novel and efficient optimization algorithm, in: 2014 IEEE Congr. Evol. Comput., IEEE, 2014: pp. 840–844.
- [186] (GWO) S. Mirjalili, S.M. Mirjalili, A. Lewis, Grey Wolf Optimizer, Adv. Eng. Softw. 69 (2014) 46–61. https://doi.org/10.1016/j.advengsoft.2013.12.007.
- [187] (SOS) M.-Y. Cheng, D. Prayogo, Symbiotic organisms search: a new metaheuristic optimization algorithm, Comput. Struct. 139 (2014) 98–112.
- [188] (CBO) A. Kaveh, V.R. Mahdavi, Colliding bodies optimization: A novel meta-heuristic method, Comput. Struct. 139 (2014) 18–27. https://doi.org/10.1016/j.compstruc.2014.04.005.
- [189] (CSO) X. Meng, Y. Liu, X. Gao, H. Zhang, A new bio-inspired algorithm: chicken swarm optimization, in: Int. Conf. Swarm Intell., Springer, 2014: pp. 86–94.
- [190] (SMO) J.C. Bansal, H. Sharma, S.S. Jadon, M. Clerc, Spider monkey optimization algorithm for numerical optimization, Memetic Comput. 6 (2014) 31–47.
- [191] (ISA) A.H. Gandomi, Interior search algorithm (ISA): a novel approach for global optimization, ISA Trans. 53 (2014) 1168–1183.
- [192] (AMOA) X. Li, J. Zhang, M. Yin, Animal migration optimization: an optimization algorithm inspired by animal migration behavior, Neural Comput. Appl. 24 (2014) 1867–1877.
- [193] (CROA) S. Salcedo-Sanz, J. Del Ser, I. Landa-Torres, S. Gil-López, J.A. Portilla-Figueras, The coral reefs optimization algorithm: a novel metaheuristic for efficiently solving optimization problems, Sci. World J. 2014 (2014).
- [194] (BMO) A. Askarzadeh, Bird mating optimizer: An optimization algorithm inspired by bird mating strategies, Commun. Nonlinear Sci. Numer. Simul. 19 (2014) 1213–1228. https://doi.org/10.1016/j.cnsns.2013.08.027.

- [195] (SSO) O. Abedinia, N. Amjady, A. Ghasemi, A new metaheuristic algorithm based on shark smell optimization, Complexity. 21 (2016) 97–116.
- [196] (EMA) N. Ghorbani, E. Babaei, Exchange market algorithm, Appl. Soft Comput. 19 (2014) 177–187.
- [197] (FOA) M. Ghaemi, M.-R. Feizi-Derakhshi, Forest optimization algorithm, Expert Syst. Appl. 41 (2014) 6676–6687.
- [198] (GBA) E. Osaba, F. Diaz, E. Onieva, Golden ball: a novel meta-heuristic to solve combinatorial optimization problems based on soccer concepts, Appl. Intell. 41 (2014) 145–166.
- [199] (KA) M. Hajiaghaei-Keshteli, M. Aminnayeri, Solving the integrated scheduling of production and rail transportation problem by Keshtel algorithm, Appl. Soft Comput. 25 (2014) 184–203.
- [200] (KP) V.V. De Melo, Kaizen programming, in: Proc. 2014 Annu. Conf. Genet. Evol. Comput., 2014: pp. 895–902.
- [201] (KGMO) S. Moein, R. Logeswaran, KGMO: A swarm optimization algorithm based on the kinetic energy of gas molecules, Inf. Sci. (Ny). 275 (2014) 127–144.
- [202] (SA) F. Merrikh-Bayat, A numerical optimization algorithm inspired by the strawberry plant, ArXiv Prepr. ArXiv1407.7399. (2014).
- [203] (HA) A. Hatamlou, Heart: a novel optimization algorithm for cluster analysis, Prog. Artif. Intell. 2 (2014) 167–173.
- [204] (AEA) M.T. Adham, P.J. Bentley, An artificial ecosystem algorithm applied to static and dynamic travelling salesman problems, in: 2014 IEEE Int. Conf. Evolvable Syst., IEEE, 2014: pp. 149–156.
- [205] (SA) D. Felipe, E.F.G. Goldbarg, M.C. Goldbarg, Scientific algorithms for the car renter salesman problem, in: 2014 IEEE Congr. Evol. Comput., IEEE, 2014: pp. 873–879.
- [206] (WO) J.-P. Arnaout, Worm optimization: a novel optimization algorithm inspired by C. Elegans, in: Proc. 2014 Int. Conf. Ind. Eng. Oper. Manag. Indones., 2014: pp. 2499–2505.
- [207] (GPO) J.S.M.L. Melvix, Greedy politics optimization: Metaheuristic inspired by political strategies adopted during state assembly elections, in: 2014 IEEE Int. Adv. Comput. Conf., IEEE, 2014: pp. 1157–1162.
- [208] (HLO) L. Wang, H. Ni, R. Yang, M. Fei, W. Ye, A simple human learning optimization algorithm, in: Comput. Intell. Networked Syst. Their Appl., Springer, 2014: pp. 56–65.
- [209] (SLCA) N. Moosavian, B. Kasaee Roodsari, Soccer league competition algorithm: A novel meta-heuristic algorithm for optimal design of water distribution networks, Swarm Evol. Comput. 17 (2014) 14–24. https://doi.org/10.1016/j.swevo.2014.02.002.
- [210] (HSSA) H. Karami, M.J. Sanjari, G.B. Gharehpetian, Hyper-Spherical Search (HSS) algorithm: a novel meta-heuristic algorithm to optimize nonlinear functions, Neural Comput. Appl. 25 (2014) 1455–1465.
- [211] (EBO) Y.-J. Zheng, H.-F. Ling, J.-Y. Xue, Ecogeography-based optimization: enhancing biogeography-based optimization with ecogeographic barriers and differentiations, Comput. Oper. Res. 50 (2014) 115–127.
- [212] (PIO) H. Duan, P. Qiao, Pigeon-inspired optimization: a new swarm intelligence optimizer for air robot path planning, Int. J. Intell. Comput. Cybern. (2014).
- [213] (ALO) S. Mirjalili, The Ant Lion Optimizer, Adv. Eng. Softw. 83 (2015) 80–98. https://doi.org/10.1016/j.advengsoft.2015.01.010.
- [214] (AAA) S.A. Uymaz, G. Tezel, E. Yel, Artificial algae algorithm (AAA) for nonlinear global

- optimization, Appl. Soft Comput. 31 (2015) 153-171.
- [215] (ASA) J. Ali, M. Saeed, M. Luqman, M.F. Tabassum, Artificial showering algorithm: a new meta-heuristic for unconstrained optimization, (2015).
- [216] (CA) M. Canayaz, A. Karcı, Investigation of cricket behaviours as evolutionary computation for system design optimization problems, Measurement. 68 (2015) 225–235.
- [217] (GEA) R.-J. Kuo, F.E. Zulvia, The gradient evolution algorithm: A new metaheuristic, Inf. Sci. (Ny). 316 (2015) 246–265.
- [218] (MFOA) S. Mirjalili, Moth-flame optimization algorithm: A novel nature-inspired heuristic paradigm, Knowledge-Based Syst. 89 (2015) 228–249. https://doi.org/10.1016/j.knosys.2015.07.006.
- [219] (MBO) G.-G. Wang, S. Deb, Z. Cui, Monarch butterfly optimization, Neural Comput. Appl. 31 (2015) 1995–2014. https://doi.org/10.1007/s00521-015-1923-y.
- [220] (WWO) Y.-J. Zheng, Water wave optimization: a new nature-inspired metaheuristic, Comput. Oper. Res. 55 (2015) 1–11.
- [221] (SFS) H. Salimi, Stochastic fractal search: a powerful metaheuristic algorithm, Knowledge-Based Syst. 75 (2015) 1–18.
- [222] (EHO) G.-G. Wang, S. Deb, L. dos S. Coelho, Elephant Herding Optimization, 2015 3rd Int. Symp. Comput. Bus. Intell. (2015) 1–5. https://doi.org/10.1109/iscbi.2015.8.
- [223] (VSA) B. Doğan, T. Ölmez, A new metaheuristic for numerical function optimization: Vortex Search algorithm, Inf. Sci. (Ny). 293 (2015) 125–145. https://doi.org/10.1016/j.ins.2014.08.053.
- [224] (EOA) G.-G. Wang, S. Deb, L.D.S. Coelho, Earthworm optimisation algorithm: a bio-inspired metaheuristic algorithm for global optimisation problems, Int. J. Bio-Inspired Comput. 12 (2018) 1–22.
- [225] (LSA) H. Shareef, A.A. Ibrahim, A.H. Mutlag, Lightning search algorithm, Appl. Soft Comput. 36 (2015) 315–333.
- [226] (HTSA) V.K. Patel, V.J. Savsani, Heat transfer search (HTS): a novel optimization algorithm, Inf. Sci. (Ny). 324 (2015) 217–246.
- [227] (IMA) B. Javidy, A. Hatamlou, S. Mirjalili, Ions motion algorithm for solving optimization problems, Appl. Soft Comput. 32 (2015) 72–79.
- [228] (OIO) A.H. Kashan, A new metaheuristic for optimization: optics inspired optimization (OIO), Comput. Oper. Res. 55 (2015) 99–125.
- [229] (TSA) M.S. Kiran, TSA: Tree-seed algorithm for continuous optimization, Expert Syst. Appl. 42 (2015) 6686–6698.
- [230] (RRA) F. Merrikh-Bayat, The runner-root algorithm: a metaheuristic for solving unimodal and multimodal optimization problems inspired by runners and roots of plants in nature, Appl. Soft Comput. 33 (2015) 292–303.
- [231] (ESA) S. Deb, S. Fong, Z. Tian, Elephant search algorithm for optimization problems, in: 2015 Tenth Int. Conf. Digit. Inf. Manag., IEEE, 2015: pp. 249–255.
- [232] (EA) H. Emami, F. Derakhshan, Election algorithm: A new socio-politically inspired strategy, AI Commun. 28 (2015) 591–603.
- [233] (LS) E. Cuevas, A. González, D. Zaldívar, M. Pérez-Cisneros, An optimisation algorithm based on the behaviour of locust swarms, Int. J. Bio-Inspired Comput. 7 (2015) 402–407.
- [234] (ITWO) D. Tang, S. Dong, Y. Jiang, H. Li, Y. Huang, ITGO: Invasive tumor growth

- optimization algorithm, Appl. Soft Comput. 36 (2015) 670-698.
- [235] (JA) C.-C. Chen, Y.-C. Tsai, I.I. Liu, C.-C. Lai, Y.-T. Yeh, S.-Y. Kuo, Y.-H. Chou, A novel metaheuristic: Jaguar algorithm with learning behavior, in: 2015 IEEE Int. Conf. Syst. Man, Cybern., IEEE, 2015: pp. 1595–1600.
- [236] (GRSA) H. Beiranvand, E. Rokrok, General relativity search algorithm: a global optimization approach, Int. J. Comput. Intell. Appl. 14 (2015) 1550017.
- [237] (RGO) X. He, S. Zhang, J. Wang, A novel algorithm inspired by plant root growth with self-similarity propagation, in: 2015 1st Int. Conf. Ind. Networks Intell. Syst., IEEE, 2015: pp. 157–162.
- [238] (BOA) O. FINDIK, Bull optimization algorithm based on genetic operators for continuous optimization problems., Turkish J. Electr. Eng. Comput. Sci. 23 (2015).
- [239] (PPA) S.L. Tilahun, H.C. Ong, Prey-predator algorithm: a new metaheuristic algorithm for optimization problems, Int. J. Inf. Technol. Decis. Mak. 14 (2015) 1331–1352.
- [240] (ABO) J.B. Odili, M.N.M. Kahar, African buffalo optimization (ABO): a new meta-heuristic algorithm, J. Adv. Appl. Sci. 3 (2015) 101–106.
- [241] (AID) G. Huang, Artificial infectious disease optimization: A SEIQR epidemic dynamic model-based function optimization algorithm, Swarm Evol. Comput. 27 (2016) 31–67.
- [242] (ANS) G. Wu, Across neighborhood search for numerical optimization, Inf. Sci. (Ny). 329 (2016) 597–618.
- [243] (CBBA) M. Canayaz, A. Karci, Cricket behaviour-based evolutionary computation technique in solving engineering optimization problems, Appl. Intell. 44 (2016) 362–376.
- [244] (COOA) Y. Sharafi, M.A. Khanesar, M. Teshnehlab, COOA: Competitive optimization algorithm, Swarm Evol. Comput. 30 (2016) 39–63.
- [245] (COA) M. Li, H. Zhao, X. Weng, T. Han, Cognitive behavior optimization algorithm for solving optimization problems, Appl. Soft Comput. 39 (2016) 199–222.
- [246] (EFO) H. Abedinpourshotorban, S.M. Shamsuddin, Z. Beheshti, D.N.A. Jawawi, Electromagnetic field optimization: a physics-inspired metaheuristic optimization algorithm, Swarm Evol. Comput. 26 (2016) 8–22.
- [247] (FGA) E. Fadakar, M. Ebrahimi, A new metaheuristic football game inspired algorithm, in: 2016 1st Conf. Swarm Intell. Evol. Comput., IEEE, 2016: pp. 6–11.
- [248] (ITGO) D. Tang, S. Dong, L. He, Y. Jiang, Intrusive tumor growth inspired optimization algorithm for data clustering, Neural Comput. Appl. 27 (2016) 349–374.
- [249] (GSO) V. Muthiah-Nakarajan, M.M. Noel, Galactic Swarm Optimization: A new global optimization metaheuristic inspired by galactic motion, Appl. Soft Comput. 38 (2016) 771–787.
- [250] (WOA) S. Mirjalili, A. Lewis, The Whale Optimization Algorithm, Adv. Eng. Softw. 95 (2016) 51–67. https://doi.org/10.1016/j.advengsoft.2016.01.008.
- [251] (SSA) S. Mirjalili, SCA: A Sine Cosine Algorithm for solving optimization problems, Knowledge-Based Syst. 96 (2016) 120–133. https://doi.org/10.1016/j.knosys.2015.12.022.
- [252] (DA) S. Mirjalili, Dragonfly algorithm: a new meta-heuristic optimization technique for solving single-objective, discrete, and multi-objective problems, Neural Comput. Appl. 27 (2015) 1053–1073. https://doi.org/10.1007/s00521-015-1920-1.
- [253] (CSA) A. Askarzadeh, A novel metaheuristic method for solving constrained engineering optimization problems: Crow search algorithm, Comput. Struct. 169 (2016) 1–12.

- https://doi.org/10.1016/j.compstruc.2016.03.001.
- [254] (MVO) S. Mirjalili, S.M. Mirjalili, A. Hatamlou, Multi-Verse Optimizer: a nature-inspired algorithm for global optimization, Neural Comput. Appl. 27 (2015) 495–513. https://doi.org/10.1007/s00521-015-1870-7.
- [255] (BSA) X.-B. Meng, X.Z. Gao, L. Lu, Y. Liu, H. Zhang, A new bio-inspired optimisation algorithm: Bird Swarm Algorithm, J. Exp. Theor. Artif. Intell. 28 (2016) 673–687.
- [256] (VCS) M.D. Li, H. Zhao, X.W. Weng, T. Han, A novel nature-inspired algorithm for optimization: Virus colony search, Adv. Eng. Softw. 92 (2016) 65–88.
- [257] (WEO) A. Kaveh, T. Bakhshpoori, Water Evaporation Optimization: A novel physically inspired optimization algorithm, Comput. Struct. 167 (2016) 69–85. https://doi.org/10.1016/j.compstruc.2016.01.008.
- [258] (RTO) Y. Labbi, D. Ben Attous, H.A. Gabbar, B. Mahdad, A. Zidan, A new rooted tree optimization algorithm for economic dispatch with valve-point effect, Int. J. Electr. Power Energy Syst. 79 (2016) 298–311.
- [259] (FIFAWA) N. Razmjooy, M. Khalilpour, M. Ramezani, A new meta-heuristic optimization algorithm inspired by FIFA world cup competitions: theory and its application in PID designing for AVR system, J. Control. Autom. Electr. Syst. 27 (2016) 419–440.
- [260] (SWA) A. Ebrahimi, E. Khamehchi, Sperm whale algorithm: an effective metaheuristic algorithm for production optimization problems, J. Nat. Gas Sci. Eng. 29 (2016) 211–222.
- [261] (VOA) Y.-C. Liang, J.R. Cuevas Juarez, A novel metaheuristic for continuous optimization problems: Virus optimization algorithm, Eng. Optim. 48 (2016) 73–93.
- [262] (DA) T.R. Biyanto, H.Y. Fibrianto, G. Nugroho, A.M. Hatta, E. Listijorini, T. Budiati, H. Huda, Duelist algorithm: an algorithm inspired by how duelist improve their capabilities in a duel, in: Int. Conf. Swarm Intell., Springer, 2016: pp. 39–47.
- [263] (RROA) A. Brabazon, W. Cui, M. O'Neill, The raven roosting optimisation algorithm, Soft Comput. 20 (2016) 525–545.
- [264] (RSS) Y. Saadi, I.T.R. Yanto, T. Herawan, V. Balakrishnan, H. Chiroma, A. Risnumawan, Ringed seal search for global optimization via a sensitive search model, PLoS One. 11 (2016) e0144371.
- [265] (FEA) A.E. Xavier, V.L. Xavier, Flying elephants: a general method for solving non-differentiable problems, J. Heuristics. 22 (2016) 649–664.
- [266] (CA) M.K. Ibrahim, R.S. Ali, Novel optimization algorithm inspired by camel traveling behavior, Iraq J. Electr. Electron. Eng. 12 (2016) 167–177.
- [267] (CEO) X. Feng, M. Ma, H. Yu, Crystal energy optimization algorithm, Comput. Intell. 32 (2016) 284–322.
- [268] (PVS) P. Savsani, V. Savsani, Passing vehicle search (PVS): A novel metaheuristic algorithm, Appl. Math. Model. 40 (2016) 3951–3978.
- [269] (TWO) A. Kaveh, A. Zolghadr, A novel meta-heuristic algorithm: tug of war optimization, Iran Univ. Sci. Technol. 6 (2016) 469–492.
- [270] (DVBA) A.O. Topal, O. Altun, A novel meta-heuristic algorithm: dynamic virtual bats algorithm, Inf. Sci. (Ny). 354 (2016) 222–235.
- [271] (LOA) M. Yazdani, F. Jolai, Lion optimization algorithm (LOA): a nature-inspired metaheuristic algorithm, J. Comput. Des. Eng. 3 (2016) 24–36.
- [272] (NFR) H. Moez, A. Kaveh, N. Taghizadieh, Natural forest regeneration algorithm: a new

- meta-heuristic, Iran. J. Sci. Technol. Trans. Civ. Eng. 40 (2016) 311–326.
- [273] (SKF) Z. Ibrahim, N.H.A. Aziz, N.A.A. Aziz, S. Razali, M.S. Mohamad, Simulated Kalman filter: a novel estimation-based metaheuristic optimization algorithm, Adv. Sci. Lett. 22 (2016) 2941–2946.
- [274] (SM²-MBO) L. Gao, Q.-K. Pan, A shuffled multi-swarm micro-migrating birds optimizer for a multi-resource-constrained flexible job shop scheduling problem, Inf. Sci. (Ny). 372 (2016) 655–676.
- [275] (YYPO) V. Punnathanam, P. Kotecha, Yin-Yang-pair Optimization: A novel lightweight optimization algorithm, Eng. Appl. Artif. Intell. 54 (2016) 62–79.
- [276] (VOA) M. Jaderyan, H. Khotanlou, Virulence optimization algorithm, Appl. Soft Comput. 43 (2016) 596–618.
- [277] (ABO) X. Qi, Y. Zhu, H. Zhang, A new meta-heuristic butterfly-inspired algorithm, J. Comput. Sci. 23 (2017) 226–239.
- [278] (CPA) A. Kaveh, A. Zolghadr, Cyclical parthenogenesis algorithm for guided modal strain energy based structural damage detection, Appl. Soft Comput. 57 (2017) 250–264.
- [279] (DOS) N. Archana, R. Vidhyapriya, A. Benedict, K. Chandran, Deterministic oscillatory search: a new meta-heuristic optimization algorithm, Sādhanā. 42 (2017) 817–826.
- [280] (FA) M. Kaedi, Fractal-based algorithm: a new metaheuristic method for continuous optimization, Int J Artif Intell. 15 (2017) 76–92.
- [281] (NCA) S. Asil Gharebaghi, M. Ardalan Asl, New meta-heuristic optimization algorithm using neuronal communication, Iran Univ. Sci. Technol. 7 (2017) 413–431.
- [282] (LAPO) A.F. Nematollahi, A. Rahiminejad, B. Vahidi, A novel physical based meta-heuristic optimization method known as Lightning Attachment Procedure Optimization, Appl. Soft Comput. 59 (2017) 596–621.
- [283] (BBA) A. Kazikova, M. Pluhacek, R. Senkerik, A. Viktorin, Proposal of a new swarm optimization method inspired in bison behavior, in: 23rd Int. Conf. Soft Comput., Springer, 2017: pp. 146–156.
- [284] (DSO) V.V. de Melo, A novel metaheuristic method for solving constrained engineering optimization problems: Drone Squadron Optimization, ArXiv Prepr. ArXiv1708.01368. (2017).
- [285] (HBO) S.-A. Ahmadi, Human behavior-based optimization: a novel metaheuristic approach to solve complex optimization problems, Neural Comput. Appl. 28 (2017) 233–244.
- [286] (VPS) A. Kaveh, M.I. Ghazaan, A new meta-heuristic algorithm: vibrating particles system, Sci. Iran. Trans. A, Civ. Eng. 24 (2017) 551.
- [287] (SHO) G. Dhiman, V. Kumar, Spotted hyena optimizer: a novel bio-inspired based metaheuristic technique for engineering applications, Adv. Eng. Softw. 114 (2017) 48–70.
- [288] (SSA) S. Mirjalili, A.H. Gandomi, S.Z. Mirjalili, S. Saremi, H. Faris, S.M. Mirjalili, Salp Swarm Algorithm: A bio-inspired optimizer for engineering design problems, Adv. Eng. Softw. 114 (2017) 163–191. https://doi.org/10.1016/j.advengsoft.2017.07.002.
- [289] (GOA) S. Saremi, S. Mirjalili, A. Lewis, Grasshopper Optimisation Algorithm: Theory and application, Adv. Eng. Softw. 105 (2017) 30–47. https://doi.org/10.1016/j.advengsoft.2017.01.004.
- [290] (RFO) S.H. Aghay Kaboli, J. Selvaraj, N.A. Rahim, Rain-fall optimization algorithm: A population based algorithm for solving constrained optimization problems, J. Comput. Sci. 19

- (2017) 31–42. https://doi.org/10.1016/j.jocs.2016.12.010.
- [291] (HCA) A. Wedyan, J. Whalley, A. Narayanan, Hydrological cycle algorithm for continuous optimization problems, J. Optim. 2017 (2017).
- [292] (KWA) T.R. Biyanto, S. Irawan, H.Y. Febrianto, N. Afdanny, A.H. Rahman, K.S. Gunawan, J.A.D. Pratama, T.N. Bethiana, Killer whale algorithm: an algorithm inspired by the life of killer whale, Procedia Comput. Sci. 124 (2017) 151–157.
- [293] (CHA) A.T.S. Al-Obaidi, H.S. Abdullah, Camel herds algorithm: A new swarm intelligent algorithm to solve optimization problems, Int. J. Perceptive Cogn. Comput. 3 (2017).
- [294] (CDOA) Q. Zhang, R. Wang, J. Yang, K. Ding, Y. Li, J. Hu, Collective decision optimization algorithm: a new heuristic optimization method, Neurocomputing. 221 (2017) 123–137.
- [295] (LCA) E. Hosseini, Laying chicken algorithm: A new meta-heuristic approach to solve continuous programming problems, J. Appl. Comput. Math. 6 (2017).
- [296] (KIA) N.S. Jaddi, J. Alvankarian, S. Abdullah, Kidney-inspired algorithm for optimization problems, Commun. Nonlinear Sci. Numer. Simul. 42 (2017) 358–369.
- [297] (Gold-SA) E. Tanyildizi, G. Demir, Golden sine algorithm: A novel math-inspired algorithm, Adv. Electr. Comput. Eng. 17 (2017) 71–78.
- [298] (SMA) O.A. Raouf, I.M. Hezam, Sperm motility algorithm: a novel metaheuristic approach for global optimisation, Int. J. Oper. Res. 28 (2017) 143–163.
- [299] (RWA) T.R. Biyanto, Rain Water Optinization Algorithm: Newton's Law of Rain Water Movements, (2017).
- [300] (TWO) A. Kaveh, A. Dadras, A novel meta-heuristic optimization algorithm: Thermal exchange optimization, Adv. Eng. Softw. 110 (2017) 69–84. https://doi.org/10.1016/j.advengsoft.2017.03.014.
- [301] (PSA) Y. Zhang, P. Zhang, S. Li, PSA: A novel optimization algorithm based on survival rules of porcellio scaber, in: 2021 IEEE 5th Adv. Inf. Technol. Electron. Autom. Control Conf., IEEE, 2021: pp. 439–442.
- [302] (SHO) F. Fausto, E. Cuevas, A. Valdivia, A. González, A global optimization algorithm inspired in the behavior of selfish herds, Biosystems. 160 (2017) 39–55.
- [303] (PBO) D. Połap, Polar bear optimization algorithm: Meta-heuristic with fast population movement and dynamic birth and death mechanism, Symmetry (Basel). 9 (2017) 203.
- [304] (SEO) A.M.F. Fard, M. Hajiaghaei-Keshteli, Social Engineering Optimization (SEO); A New Single-Solution Meta-heuristic Inspired by Social Engineering, (n.d.).
- [305] (SIO) A. Tzanetos, G. Dounias, A new metaheuristic method for optimization: sonar inspired optimization, in: Int. Conf. Eng. Appl. Neural Networks, Springer, 2017: pp. 417–428.
- [306] (WSA) A. Baykasoğlu, Ş. Akpinar, Weighted Superposition Attraction (WSA): A swarm intelligence algorithm for optimization problems—Part 1: Unconstrained optimization, Appl. Soft Comput. 56 (2017) 520–540.
- [307] (SBO) S.H.S. Moosavi, V.K. Bardsiri, Satin bowerbird optimizer: A new optimization algorithm to optimize ANFIS for software development effort estimation, Eng. Appl. Artif. Intell. 60 (2017) 1–15.
- [308] (A3) A.E. Yildirim, A. Karci, Applications of artificial atom algorithm to small-scale traveling salesman problems, Soft Comput. 22 (2018) 7619–7631.
- [309] (ASI) L. Rosenberg, M. Lungren, S. Halabi, G. Willcox, D. Baltaxe, M. Lyons, Artificial swarm intelligence employed to amplify diagnostic accuracy in radiology, in: 2018 IEEE 9th Annu.

- Inf. Technol. Electron. Mob. Commun. Conf., IEEE, 2018: pp. 1186–1191.
- [310] (BLA) S. Bitam, S. Zeadally, A. Mellouk, Fog computing job scheduling optimization based on bees swarm, Enterp. Inf. Syst. 12 (2018) 373–397.
- [311] (BSOA) T. Wang, L. Yang, Beetle swarm optimization algorithm: Theory and application, ArXiv Prepr. ArXiv1808.00206. (2018).
- [312] (BVOA) M. Ghaemidizaji, C. Dadkhah, H. Leung, A new optimization algorithm based on the behavior of BrunsVigia flower, in: 2018 IEEE Int. Conf. Syst. Man, Cybern., IEEE, 2018: pp. 263–267.
- [313] (CTOA) J. Chen, H. Cai, W. Wang, A new metaheuristic algorithm: car tracking optimization algorithm, Soft Comput. 22 (2018) 3857–3878.
- [314] (CBA) C.E. Klein, V.C. Mariani, L. dos Santos Coelho, Cheetah Based Optimization Algorithm: A Novel Swarm Intelligence Paradigm., in: ESANN, Bruges, Belgium, 2018: pp. 685–690.
- [315] (CCA) M. Goudhaman, Cheetah chase algorithm (CCA): a nature-inspired metaheuristic algorithm, Int. J. Eng. Technol. 7 (2018) 1804–1811.
- [316] (CCSA) R.M. Rizk-Allah, A.E. Hassanien, S. Bhattacharyya, Chaotic crow search algorithm for fractional optimization problems, Appl. Soft Comput. 71 (2018) 1161–1175.
- [317] (CSPF) M.C. Catalbas, A. Gulten, Circular structures of puffer fish: a new metaheuristic optimization algorithm, in: 2018 Third Int. Conf. Electr. Biomed. Eng. Clean Energy Green Comput., IEEE, 2018: pp. 1–5.
- [318] (CLA) A. Afroughinia, R. Kardehi Moghaddam, Competitive learning: a new meta-heuristic optimization algorithm, Int. J. Artif. Intell. Tools. 27 (2018) 1850035.
- [319] (CCA) J. Deuri, S.S. Sathya, Cricket chirping algorithm: an efficient meta-heuristic for numerical function optimisation, Int. J. Comput. Sci. Eng. 16 (2018) 162–172.
- [320] (FLA) A. Etminaniesfahani, A. Ghanbarzadeh, Z. Marashi, Fibonacci indicator algorithm: A novel tool for complex optimization problems, Eng. Appl. Artif. Intell. 74 (2018) 1–9.
- [321] (PSDM) C. Caraveo, F. Valdez, O. Castillo, A new optimization meta-heuristic algorithm based on self-defense mechanism of the plants with three reproduction operators, Soft Comput. 22 (2018) 4907–4920.
- [322] (EPO) G. Dhiman, V. Kumar, Emperor penguin optimizer: A bio-inspired algorithm for engineering problems, Knowledge-Based Syst. 159 (2018) 20–50.
- [323] (LPOA) A. Kaveh, S. Mahjoubi, Lion Pride Optimization Algorithm: A meta-heuristic method for global optimization problems, Sci. Iran. 0 (2018) 0. https://doi.org/10.24200/sci.2018.20833.
- [324] (MQHO) P. Wang, X. Ye, B. Li, K. Cheng, Multi-scale quantum harmonic oscillator algorithm for global numerical optimization, Appl. Soft Comput. 69 (2018) 655–670.
- [325] (MRO) M. Bidar, H.R. Kanan, M. Mouhoub, S. Sadaoui, Mushroom Reproduction Optimization (MRO): a novel nature-inspired evolutionary algorithm, in: 2018 IEEE Congr. Evol. Comput., IEEE, 2018: pp. 1–10.
- [326] (TGA) A. Cheraghalipour, M. Hajiaghaei-Keshteli, M.M. Paydar, Tree Growth Algorithm (TGA): A novel approach for solving optimization problems, Eng. Appl. Artif. Intell. 72 (2018) 393–414.
- [327] (MSA) G.-G. Wang, Moth search algorithm: a bio-inspired metaheuristic algorithm for global optimization problems, Memetic Comput. 10 (2018) 151–164.
- [328] (FF) H. Shayanfar, F.S. Gharehchopogh, Farmland fertility: A new metaheuristic algorithm for

- solving continuous optimization problems, Appl. Soft Comput. 71 (2018) 728–746.
- [329] (PBA) N.A. Kallioras, N.D. Lagaros, D.N. Avtzis, Pity beetle algorithm—A new metaheuristic inspired by the behavior of bark beetles, Adv. Eng. Softw. 121 (2018) 147–166.
- [330] (MBF) E. Jahani, M. Chizari, Tackling global optimization problems with a novel algorithm–Mouth Brooding Fish algorithm, Appl. Soft Comput. 62 (2018) 987–1002.
- [331] (AFOA) L. Cheng, X. Wu, Y. Wang, Artificial flora (AF) optimization algorithm, Appl. Sci. 8 (2018) 329.
- [332] (ESWS) S. Mandal, Elephant swarm water search algorithm for global optimization, Sādhanā. 43 (2018) 1–21.
- [333] (SSOA) H.A. Shehadeh, I. Ahmedy, M.Y.I. Idris, Sperm swarm optimization algorithm for optimizing wireless sensor network challenges, in: Proc. 6th Int. Conf. Commun. Broadband Netw., 2018: pp. 53–59.
- [334] (TGA) M.J. Mahmoodabadi, M. Rasekh, T. Zohari, TGA: Team game algorithm, Futur. Comput. Informatics J. 3 (2018) 191–199.
- [335] (COA) J. Pierezan, L.D.S. Coelho, Coyote optimization algorithm: a new metaheuristic for global optimization problems, in: 2018 IEEE Congr. Evol. Comput., IEEE, 2018: pp. 1–8.
- [336] (QSA) J. Zhang, M. Xiao, L. Gao, Q. Pan, Queuing search algorithm: A novel metaheuristic algorithm for solving engineering optimization problems, Appl. Math. Model. 63 (2018) 464–490. https://doi.org/10.1016/j.apm.2018.06.036.
- [337] (SO) A.A. Hudaib, H.N. Fakhouri, Supernova optimizer: a novel natural inspired meta-heuristic, Mod. Appl. Sci. 12 (2018) 32–50.
- [338] (SS) D. Puangdownreong, Spiritual search: a novel metaheuristic algorithm for control engineering optimization, Int. Rev. Autom. Control. 11 (2018) 86–97.
- [339] (SBO) M. Farshchin, M. Maniat, C. V Camp, S. Pezeshk, School based optimization algorithm for design of steel frames, Eng. Struct. 171 (2018) 326–335. https://doi.org/10.1016/j.engstruct.2018.05.085.
- [340] (WVO) S. Dolatabadi, Weighted vertices optimizer (WVO): A novel metaheuristic optimization algorithm, Numer. Algebr. Control Optim. 8 (2018) 461.
- [341] (VPLA) R. Moghdani, K. Salimifard, Volleyball premier league algorithm, Appl. Soft Comput. 64 (2018) 161–185.
- [342] (YSGA) D. Zaldívar, B. Morales, A. Rodríguez, A. Valdivia-G, E. Cuevas, M. Pérez-Cisneros, A novel bio-inspired optimization model based on Yellow Saddle Goatfish behavior, Biosystems. 174 (2018) 1–21.
- [343] (ROA) S.Z. Koohi, N.A.W.A. Hamid, M. Othman, G. Ibragimov, Raccoon optimization algorithm, IEEE Access. 7 (2018) 5383–5399.
- [344] (ACA) B. Almonacid, R. Soto, Andean Condor Algorithm for cell formation problems, Nat. Comput. 18 (2019) 351–381.
- [345] (AA) M.F. Pook, E.I. Ramlan, The Anglerfish algorithm: a derivation of randomized incremental construction technique for solving the traveling salesman problem, Evol. Intell. 12 (2019) 11–20.
- [346] (AEO) W. Zhao, L. Wang, Z. Zhang, Artificial ecosystem-based optimization: a novel nature-inspired meta-heuristic algorithm, Neural Comput. Appl. 32 (2019) 9383–9425. https://doi.org/10.1007/s00521-019-04452-x.
- [347] (ASOA) W. Zhao, L. Wang, Z. Zhang, A novel atom search optimization for dispersion

- coefficient estimation in groundwater, Futur. Gener. Comput. Syst. 91 (2019) 601–610. https://doi.org/10.1016/j.future.2018.05.037.
- [348] (AFB) J.-B. Lamy, Artificial Feeding Birds (AFB): a new metaheuristic inspired by the behavior of pigeons, in: Adv. Nature-Inspired Comput. Appl., Springer, 2019: pp. 43–60.
- [349] (ACCS) A. Kaveh, M. Kooshkebaghi, Artificial coronary circulation system: A new bio-inspired metaheuristic algorithm, Sci. Iran. 26 (2019) 2731–2747.
- [350] (AEFA) A. Yadav, AEFA: Artificial electric field algorithm for global optimization, Swarm Evol. Comput. 48 (2019) 93–108.
- [351] (BTA) M. Bodaghi, K. Samieefar, Meta-heuristic bus transportation algorithm, Iran J. Comput. Sci. 2 (2019) 23–32.
- [352] (BMA) Q. Zhang, R. Wang, J. Yang, A. Lewis, F. Chiclana, S. Yang, Biology migration algorithm: a new nature-inspired heuristic methodology for global optimization, Soft Comput. 23 (2019) 7333–7358.
- [353] (BUZOA) A. Arshaghi, M. Ashourian, L. Ghabeli, Buzzard optimization algorithm: A nature-inspired metaheuristic algorithm, Majlesi J. Electr. Eng. 13 (2019) 83–98.
- [354] (BM) M. Mahmood, B. Al-Khateeb, The blue monkey: A new nature inspired metaheuristic optimization algorithm, Period. Eng. Nat. Sci. 7 (2019) 1054–1066.
- [355] (CDA) G.I. Sayed, A. Tharwat, A.E. Hassanien, Chaotic dragonfly algorithm: an improved metaheuristic algorithm for feature selection, Appl. Intell. 49 (2019) 188–205.
- [356] (CCOA) J. Pierezan, G. Maidl, E.M. Yamao, L. dos Santos Coelho, V.C. Mariani, Cultural coyote optimization algorithm applied to a heavy duty gas turbine operation, Energy Convers. Manag. 199 (2019) 111932.
- [357] (DGO) M. DEHGHANI, Z. MONTAZERI, O.P. MALIK, DGO: Dice game optimizer, Gazi Univ. J. Sci. 32 (2019) 871–882.
- [358] (DTO) M. Dehghani, M. Mardaneh, O.P. Malik, S.M. NouraeiPour, DTO: Donkey theorem optimization, in: 2019 27th Iran. Conf. Electr. Eng., IEEE, 2019: pp. 1855–1859.
- [359] (DHOA) G. Brammya, S. Praveena, N.S. Ninu Preetha, R. Ramya, B.R. Rajakumar, D. Binu, Deer hunting optimization algorithm: a new nature-inspired meta-heuristic paradigm, Comput. J. (2019).
- [360] (FOA) E.H. de Vasconcelos Segundo, V.C. Mariani, L. dos Santos Coelho, Design of heat exchangers using Falcon Optimization Algorithm, Appl. Therm. Eng. 156 (2019) 119–144.
- [361] (F3EA) A.H. Kashan, R. Tavakkoli-Moghaddam, M. Gen, Find-Fix-Finish-Exploit-Analyze (F3EA) meta-heuristic algorithm: An effective algorithm with new evolutionary operators for global optimization, Comput. Ind. Eng. 128 (2019) 192–218.
- [362] (FRA) M. Tahani, N. Babayan, Flow Regime Algorithm (FRA): a physics-based meta-heuristics algorithm, Knowl. Inf. Syst. 60 (2019) 1001–1038.
- [363] (COFA) G.I. Sayed, M. Solyman, A.E. Hassanien, A novel chaotic optimal foraging algorithm for unconstrained and constrained problems and its application in white blood cell segmentation, Neural Comput. Appl. 31 (2019) 7633–7664.
- [364] (NMR) R. Salgotra, U. Singh, The naked mole-rat algorithm, Neural Comput. Appl. 31 (2019) 8837–8857.
- [365] (XOA) F. Samie Yousefi, N. Karimian, A. Ghodousian, Xerus Optimization Algorithm (XOA): a novel nature-inspired metaheuristic algorithm for solving global optimization problems, J. Algorithms Comput. 51 (2019) 111–126.

- [366] (NRO) Z. Wei, C. Huang, X. Wang, T. Han, Y. Li, Nuclear reaction optimization: A novel and powerful physics-based algorithm for global optimization, IEEE Access. 7 (2019) 66084–66109.
- [367] (HNAA) O. Maciel, A. Valdivia, D. Oliva, E. Cuevas, D. Zaldívar, M. Pérez-Cisneros, A novel hybrid metaheuristic optimization method: hypercube natural aggregation algorithm, Soft Comput. (2019) 1–34.
- [368] (SO) S. Shadravan, H.R. Naji, V.K. Bardsiri, The Sailfish Optimizer: A novel nature-inspired metaheuristic algorithm for solving constrained engineering optimization problems, Eng. Appl. Artif. Intell. 80 (2019) 20–34.
- [369] (AIG) P. Pijarski, P. Kacejko, A new metaheuristic optimization method: the algorithm of the innovative gunner (AIG), Eng. Optim. (2019).
- [370] (SDBO) W. Zhao, L. Wang, Z. Zhang, Supply-Demand-Based Optimization: A Novel Economics-Inspired Algorithm for Global Optimization, IEEE Access. 7 (2019) 73182–73206. https://doi.org/10.1109/access.2019.2918753.
- [371] (BOA) S. Arora, S. Singh, Butterfly optimization algorithm: a novel approach for global optimization, Soft Comput. 23 (2019) 715–734.
- [372] (EPC) S. Harifi, M. Khalilian, J. Mohammadzadeh, S. Ebrahimnejad, Emperor Penguins Colony: a new metaheuristic algorithm for optimization, Evol. Intell. 12 (2019) 211–226.
- [373] (ERSA) S. Rahmanzadeh, M.S. Pishvaee, Electron radar search algorithm: a novel developed meta-heuristic algorithm, Soft Comput. (2019) 1–23.
- [374] (HGSO) F.A. Hashim, E.H. Houssein, M.S. Mabrouk, W. Al-Atabany, S. Mirjalili, Henry gas solubility optimization: A novel physics-based algorithm, Futur. Gener. Comput. Syst. 101 (2019) 646–667. https://doi.org/10.1016/j.future.2019.07.015.
- [375] (HBIA) R.G. Morais, N. Nedjah, L.M. Mourelle, A novel metaheuristic inspired by Hitchcock birds' behavior for efficient optimization of large search spaces of high dimensionality, Soft Comput. (2019) 1–23.
- [376] (HOA) A. Ali, K. Zafar, T. Bakhshi, On Nature-Inspired Dynamic Route Planning: Hammerhead Shark Optimization Algorithm, in: 2019 15th Int. Conf. Emerg. Technol., IEEE, 2019: pp. 1–6.
- [377] (FDO) J.M. Abdullah, T. Ahmed, Fitness dependent optimizer: inspired by the bee swarming reproductive process, IEEE Access. 7 (2019) 43473–43486.
- [378] (LCBO) A. Khatri, A. Gaba, K.P.S. Rana, V. Kumar, A novel life choice-based optimizer, Soft Comput. 24 (2019) 9121–9141. https://doi.org/10.1007/s00500-019-04443-z.
- [379] (PPA) A.-A.A. Mohamed, S.A. Hassan, A.M. Hemeida, S. Alkhalaf, M.M.M. Mahmoud, A.M.B. Eldin, Parasitism–Predation algorithm (PPA): A novel approach for feature selection, Ain Shams Eng. J. 11 (2020) 293–308.
- [380] (PA) H. Yapici, N. Cetinkaya, A new meta-heuristic optimizer: pathfinder algorithm, Appl. Soft Comput. 78 (2019) 545–568.
- [381] (PROA) S.H. Samareh Moosavi, V.K. Bardsiri, Poor and rich optimization algorithm: A new human-based and multi populations algorithm, Eng. Appl. Artif. Intell. 86 (2019) 165–181. https://doi.org/10.1016/j.engappai.2019.08.025.
- [382] (SOA) G. Dhiman, V. Kumar, Seagull optimization algorithm: Theory and its applications for large-scale industrial engineering problems, Knowledge-Based Syst. 165 (2019) 169–196. https://doi.org/10.1016/j.knosys.2018.11.024.
- [383] (STOA) G. Dhiman, A. Kaur, STOA: A bio-inspired based optimization algorithm for industrial

- engineering problems, Eng. Appl. Artif. Intell. 82 (2019) 148–174. https://doi.org/10.1016/j.engappai.2019.03.021.
- [384] (HHO) A.A. Heidari, S. Mirjalili, H. Faris, I. Aljarah, M. Mafarja, H. Chen, Harris hawks optimization: Algorithm and applications, Futur. Gener. Comput. Syst. 97 (2019) 849–872.
- [385] (BO) A.K. Das, D.K. Pratihar, A new bonobo optimizer (BO) for real-parameter optimization, in: 2019 IEEE Reg. 10 Symp., IEEE, 2019: pp. 108–113.
- [386] (SSO) J. Zhao, D. Tang, Z. Liu, Y. Cai, S. Dong, Spherical search optimizer: a simple yet efficient meta-heuristic approach, Neural Comput. Appl. (2019) 1–32.
- [387] (SSA) M. Jain, V. Singh, A. Rani, A novel nature-inspired algorithm for optimization: Squirrel search algorithm, Swarm Evol. Comput. 44 (2019) 148–175.
- [388] (FSO) G. Azizyan, F. Miarnaeimi, M. Rashki, N. Shabakhty, Flying Squirrel Optimizer (FSO): A novel SI-based optimization algorithm for engineering problems, Iran. J. Optim. 11 (2019) 177–205.
- [389] (BESO) H.A. Alsattar, A.A. Zaidan, B.B. Zaidan, Novel meta-heuristic bald eagle search optimisation algorithm, Artif. Intell. Rev. 53 (2020) 2237–2264.
- [390] (SAR) A. Shabani, B. Asgarian, S.A. Gharebaghi, M.A. Salido, A. Giret, A new optimization algorithm based on search and rescue operations, Math. Probl. Eng. 2019 (2019).
- [391] (WMC) S. Nejatian, R. Omidvar, H. Parvin, V. Rezaei, M. Yasrebi, A New Algorithm: Wild Mice Colony Algorithm (WMC), TABRIZ J. Electr. Eng. 49 (2019) 425–437.
- [392] (TPA) H. Bagheri, A. Lashkar Ara, R. Hosseini, Thieves and Police, a New Optimization Algorithm: Theory and Application in Probabilistic Power Flow, IETE J. Res. (2019) 1–18.
- [393] (ATLA) X. Han, X. Du, P. Yu, ATLA: A novel metaheuristic optimization algorithm inspired by the mating search behavior of longicorn beetles in the nature, in: IOP Conf. Ser. Mater. Sci. Eng., IOP Publishing, 2020: p. 52028.
- [394] (BMO) M.H. Sulaiman, Z. Mustaffa, M.M. Saari, H. Daniyal, Barnacles Mating Optimizer: A new bio-inspired algorithm for solving engineering optimization problems, Eng. Appl. Artif. Intell. 87 (2020). https://doi.org/10.1016/j.engappai.2019.103330.
- [395] (BHMO) A. Kaveh, M.R. Seddighian, E. Ghanadpour, Black Hole Mechanics Optimization: a novel meta-heuristic algorithm, Asian J. Civ. Eng. 21 (2020) 1129–1149. https://doi.org/10.1007/s42107-020-00282-8.
- [396] (BIOA) A. Kaveh, M. Khanzadi, M. Rastegar Moghaddam, Billiards-inspired optimization algorithm; a new meta-heuristic method, Structures. 27 (2020) 1722–1739. https://doi.org/10.1016/j.istruc.2020.07.058.
- [397] (BCO) T. Dutta, S. Bhattacharyya, S. Dey, J. Platos, Border collie optimization, IEEE Access. 8 (2020) 109177–109197.
- [398] (BSSA) A. Ghasemi-Marzbali, A novel nature-inspired meta-heuristic algorithm for optimization: bear smell search algorithm, Soft Comput. 24 (2020) 13003–13035.
- [399] (BIMHO) S. Debnath, W. Arif, S. Baishya, Buyer Inspired Meta-Heuristic Optimization Algorithm, Open Comput. Sci. 10 (2020) 194–219. https://doi.org/10.1515/comp-2020-0101.
- [400] (DGO) M. Dehghani, Z. Montazeri, H. Givi, J. Guerrero, G. Dhiman, Darts Game Optimizer: A New Optimization Technique Based on Darts Game, Int. J. Intell. Eng. Syst. 13 (2020) 286–294. https://doi.org/10.22266/ijies2020.1031.26.
- [401] (DDAO) H.N. Ghafil, K. Jármai, Dynamic differential annealed optimization: New metaheuristic optimization algorithm for engineering applications, Appl. Soft Comput. 93 (2020).

- https://doi.org/10.1016/j.asoc.2020.106392.
- [402] (DOA) A.I. Wagan, M.M. Shaikh, Numerical data for wind turbine micrositing inspired by human dynasties by use of the Dynastic Optimization Algorithm (DOA), 3C Tecnol. Glosas Innovación Apl. a La Pyme. (2020) 71–85.
- [403] (FBI) J.-S. Chou, N.-M. Nguyen, FBI inspired meta-optimization, Appl. Soft Comput. 93 (2020) 106339.
- [404] (PGO) A. Kaveh, H. Akbari, S.M. Hosseini, Plasma generation optimization: a new physically-based metaheuristic algorithm for solving constrained optimization problems, Eng. Comput. (2020).
- [405] (NMA) S. Gholizadeh, M. Danesh, C. Gheyratmand, A new Newton metaheuristic algorithm for discrete performance-based design optimization of steel moment frames, Comput. Struct. 234 (2020) 106250.
- [406] (TSA) S. Kaur, L.K. Awasthi, A.L. Sangal, G. Dhiman, Tunicate Swarm Algorithm: A new bio-inspired based metaheuristic paradigm for global optimization, Eng. Appl. Artif. Intell. 90 (2020) 103541.
- [407] (MPA) A. Faramarzi, M. Heidarinejad, S. Mirjalili, A.H. Gandomi, Marine Predators Algorithm:

 A nature-inspired metaheuristic, Expert Syst. Appl. 152 (2020) 113377.

 https://doi.org/https://doi.org/10.1016/j.eswa.2020.113377.
- [408] (EO) A. Faramarzi, M. Heidarinejad, B. Stephens, S. Mirjalili, Equilibrium optimizer: A novel optimization algorithm, Knowledge-Based Syst. 191 (2020) 105190. https://doi.org/https://doi.org/10.1016/j.knosys.2019.105190.
- [409] (EFO) S. Yilmaz, S. Sen, Electric fish optimization: a new heuristic algorithm inspired by electrolocation, Neural Comput. Appl. 32 (2020) 11543–11578.
- [410] (SMA) S. Li, H. Chen, M. Wang, A.A. Heidari, S. Mirjalili, Slime mould algorithm: A new method for stochastic optimization, Futur. Gener. Comput. Syst. 111 (2020) 300–323.
- [411] (BWOA) V. Hayyolalam, A.A.P. Kazem, Black widow optimization algorithm: a novel meta-heuristic approach for solving engineering optimization problems, Eng. Appl. Artif. Intell. 87 (2020) 103249.
- [412] (MRFO) W. Zhao, Z. Zhang, L. Wang, Manta ray foraging optimization: An effective bio-inspired optimizer for engineering applications, Eng. Appl. Artif. Intell. 87 (2020). https://doi.org/10.1016/j.engappai.2019.103300.
- [413] (MA) K. Zervoudakis, S. Tsafarakis, A mayfly optimization algorithm, Comput. Ind. Eng. 145 (2020) 106559.
- [414] (OA) H. Drias, Y. Drias, I. Khennak, A new swarm algorithm based on orcas intelligence for solving maze problems, in: World Conf. Inf. Syst. Technol., Springer, 2020: pp. 788–797.
- [415] (PO) Q. Askari, I. Younas, M. Saeed, Political Optimizer: A novel socio-inspired meta-heuristic for global optimization, Knowledge-Based Syst. 195 (2020). https://doi.org/10.1016/j.knosys.2020.105709.
- [416] (GTOA) Y. Zhang, Z. Jin, Group teaching optimization algorithm: A novel metaheuristic method for solving global optimization problems, Expert Syst. Appl. 148 (2020). https://doi.org/10.1016/j.eswa.2020.113246.
- [417] (TFWO) M. Ghasemi, I.F. Davoudkhani, E. Akbari, A. Rahimnejad, S. Ghavidel, L. Li, A novel and effective optimization algorithm for global optimization and its engineering applications: Turbulent Flow of Water-based Optimization (TFWO), Eng. Appl. Artif. Intell. 92 (2020)

- [418] (HUA) H. Ghasemian, F. Ghasemian, H. Vahdat-Nejad, Human urbanization algorithm: A novel metaheuristic approach, Math. Comput. Simul. 178 (2020) 1–15. https://doi.org/10.1016/j.matcom.2020.05.023.
- [419] (COA) M. Khishe, M.R. Mosavi, Chimp optimization algorithm, Expert Syst. Appl. 149 (2020) 113338.
- [420] (COA) F. Martínez-Álvarez, G. Asencio-Cortés, J.F. Torres, D. Gutiérrez-Avilés, L. Melgar-García, R. Pérez-Chacón, C. Rubio-Escudero, J.C. Riquelme, A. Troncoso, Coronavirus optimization algorithm: a bioinspired metaheuristic based on the COVID-19 propagation model, Big Data. 8 (2020) 308–322.
- [421] (CVA) E. Hosseini, K.Z. Ghafoor, A.S. Sadiq, M. Guizani, A. Emrouznejad, Covid-19 optimizer algorithm, modeling and controlling of coronavirus distribution process, IEEE J. Biomed. Heal. Informatics. 24 (2020) 2765–2775.
- [422] (MGPE) X. Xu, Z. Hu, Q. Su, Y. Li, J. Dai, Multivariable grey prediction evolution algorithm: a new metaheuristic, Appl. Soft Comput. 89 (2020) 106086.
- [423] (SOA) A. Kaur, S. Jain, S. Goel, Sandpiper optimization algorithm: a novel approach for solving real-life engineering problems, Appl. Intell. 50 (2020) 582–619.
- [424] (SSOM) A. Kaveh, A. Zaerreza, Shuffled shepherd optimization method: a new Meta-heuristic algorithm, Eng. Comput. 37 (2020) 2357–2389. https://doi.org/10.1108/ec-10-2019-0481.
- [425] (RDA) A.M. Fathollahi-Fard, M. Hajiaghaei-Keshteli, R. Tavakkoli-Moghaddam, Red deer algorithm (RDA): a new nature-inspired meta-heuristic, Soft Comput. 24 (2020) 14637–14665.
- [426] (GTOM) A.F. Nematollahi, A. Rahiminejad, B. Vahidi, A novel meta-heuristic optimization method based on golden ratio in nature, Soft Comput. 24 (2020) 1117–1151.
- [427] (GSKA) A.W. Mohamed, A.A. Hadi, A.K. Mohamed, Gaining-sharing knowledge based algorithm for solving optimization problems: a novel nature-inspired algorithm, Int. J. Mach. Learn. Cybern. 11 (2020) 1501–1529. https://doi.org/10.1007/s13042-019-01053-x.
- [428] (AISA) E. Bogar, S. Beyhan, Adolescent Identity Search Algorithm (AISA): A novel metaheuristic approach for solving optimization problems, Appl. Soft Comput. 95 (2020). https://doi.org/10.1016/j.asoc.2020.106503.
- [429] (CSA) M. Braik, A. Sheta, H. Al-Hiary, A novel meta-heuristic search algorithm for solving optimization problems: capuchin search algorithm, Neural Comput. Appl. 33 (2021) 2515–2547.
- [430] (GPC) S. Harifi, J. Mohammadzadeh, M. Khalilian, S. Ebrahimnejad, Giza Pyramids Construction: an ancient-inspired metaheuristic algorithm for optimization, Evol. Intell. (2020) 1–19.
- [431] (GTA) G. Meirelles, B. Brentan, J. Izquierdo, E. Luvizotto, Grand Tour Algorithm: Novel Swarm-Based Optimization for High-Dimensional Problems, Processes. 8 (2020) 980.
- [432] (GFA) R. Guha, S. Ghosh, K.K. Ghosh, R. Sarkar, Groundwater Flow Algorithm: A Novel Hydro-geology based Optimization Algorithm, (2020).
- [433] (GO) I. Ahmadianfar, O. Bozorg-Haddad, X. Chu, Gradient-based optimizer: A new metaheuristic optimization algorithm, Inf. Sci. (Ny). 540 (2020) 131–159.
- [434] (IAS) M. Jahangiri, M.A. Hadianfard, M.A. Najafgholipour, M. Jahangiri, M.R. Gerami, Interactive autodidactic school: A new metaheuristic optimization algorithm for solving mathematical and structural design optimization problems, Comput. Struct. 235 (2020) 106268.

- [435] (LFD) E.H. Houssein, M.R. Saad, F.A. Hashim, H. Shaban, M. Hassaballah, Lévy flight distribution: A new metaheuristic algorithm for solving engineering optimization problems, Eng. Appl. Artif. Intell. 94 (2020) 103731.
- [436] (MSA) M. Dehghani, H. Samet, Momentum search algorithm: A new meta-heuristic optimization algorithm inspired by momentum conservation law, SN Appl. Sci. 2 (2020) 1–15.
- [437] (NPO) S.Q. Salih, A.A. Alsewari, A new algorithm for normal and large-scale optimization problems: Nomadic People Optimizer, Neural Comput. Appl. 32 (2020) 10359–10386.
- [438] (NCCL) W. Al-Sorori, A.M. Mohsen, New Caledonian crow learning algorithm: A new metaheuristic algorithm for solving continuous optimization problems, Appl. Soft Comput. 92 (2020). https://doi.org/10.1016/j.asoc.2020.106325.
- [439] (HOA) D. Moldovan, Horse Optimization Algorithm: A Novel Bio-Inspired Algorithm for Solving Global Optimization Problems, in: Comput. Sci. On-Line Conf., Springer, 2020: pp. 195–209.
- [440] (RA) R. Rao, Rao algorithms: Three metaphor-less simple algorithms for solving optimization problems, Int. J. Ind. Eng. Comput. 11 (2020) 107–130.
- [441] (RSO) G. Dhiman, M. Garg, A. Nagar, V. Kumar, M. Dehghani, A novel algorithm for global optimization: Rat Swarm Optimizer, J. Ambient Intell. Humaniz. Comput. (2020). https://doi.org/10.1007/s12652-020-02580-0.
- [442] (ROA) A.R. Moazzeni, E. Khamehchi, Rain optimization algorithm (ROA): A new metaheuristic method for drilling optimization solutions, J. Pet. Sci. Eng. 195 (2020) 107512.
- [443] (SPOA) B. Das, V. Mukherjee, D. Das, Student psychology based optimization algorithm: a new population based optimization algorithm for solving optimization problems, Adv. Eng. Softw. 146 (2020) 102804.
- [444] (SOA) H. Emami, Seasons optimization algorithm, Eng. Comput. (2020) 1–21.
- [445] (SGO) M. Dehghani, Z. Montazeri, O. Malik, H. Givi, J. Guerrero, Shell Game Optimization: A Novel Game-Based Algorithm, Int. J. Intell. Eng. Syst. 13 (2020) 246–255. https://doi.org/10.22266/ijies2020.0630.23.
- [446] (SSA) J. Xue, B. Shen, A novel swarm intelligence optimization approach: sparrow search algorithm, Syst. Sci. Control Eng. 8 (2020) 22–34.
- [447] (TTA) M.F.F.A. Rashid, Tiki-taka algorithm: a novel metaheuristic inspired by football playing style, Eng. Comput. (2020).
- [448] (TSO) M.H. Qais, H.M. Hasanien, S. Alghuwainem, Transient search optimization: a new meta-heuristic optimization algorithm, Appl. Intell. 50 (2020) 3926–3941. https://doi.org/10.1007/s10489-020-01727-y.
- [449] (VLEA) C. Taramasco, B. Crawford, R. Soto, E.M. Cortés-Toro, R. Olivares, A new metaheuristic based on vapor-liquid equilibrium for solving a new patient bed assignment problem, Expert Syst. Appl. 158 (2020) 113506.
- [450] (VSO) Z. Li, V. Tam, A novel meta-heuristic optimization algorithm inspired by the spread of viruses, ArXiv Prepr. ArXiv2006.06282. (2020).
- [451] (WFS) N. Covic, B. Lacevic, Wingsuit flying search—A novel global optimization algorithm, IEEE Access. 8 (2020) 53883–53900.
- [452] (WSA) A. Kaveh, A. Dadras Eslamlou, Water strider algorithm: A new metaheuristic and applications, Structures. 25 (2020) 520–541. https://doi.org/https://doi.org/10.1016/j.istruc.2020.03.033.

- [453] (WMA) M. Karimzadeh Parizi, F. Keynia, A. Khatibi Bardsiri, Woodpecker Mating Algorithm (WMA): a nature-inspired algorithm for solving optimization problems, Int. J. Nonlinear Anal. Appl. 11 (2020) 137–157.
- [454] (SSA) F. Zitouni, S. Harous, R. Maamri, The Solar System Algorithm: a novel metaheuristic method for global optimization, IEEE Access. 9 (2020) 4542–4565.
- [455] (ARSH-FATI-CHS) H. Ali, U.U. Tariq, M. Hussain, L. Lu, J. Panneerselvam, X. Zhai, ARSH-FATI: A Novel Metaheuristic for Cluster Head Selection in Wireless Sensor Networks, IEEE Syst. J. 15 (2020) 2386–2397.
- [456] (TYA) T. Li, S. Fong, A.J. Tallón-Ballesteros, Teng-Yue algorithm: A novel metaheuristic search method for fast cancer classification, in: Proc. 2020 Genet. Evol. Comput. Conf. Companion, 2020: pp. 47–48.
- [457] (PO) M.R. Kahrizi, S.J. Kabudian, Projectiles Optimization: A Novel Metaheuristic Algorithm for Global Optimization, Int. J. Eng. 33 (2020) 1924–1938.
- [458] (CHA) M. Zaeimi, A. Ghoddosian, Color harmony algorithm: an art-inspired metaheuristic for mathematical function optimization, Soft Comput. 24 (2020) 12027–12066.
- [459] (MOBAS) J. Zhang, Y. Huang, G. Ma, B. Nener, Multi-objective beetle antennae search algorithm, ArXiv Prepr. ArXiv2002.10090. (2020).
- [460] (OOA) N.A. Golilarz, H. Gao, A. Addeh, S. Pirasteh, ORCA optimization algorithm: a new meta-heuristic tool for complex optimization problems, in: 2020 17th Int. Comput. Conf. Wavelet Act. Media Technol. Inf. Process., IEEE, 2020: pp. 198–204.
- [461] (PAS) Y. Liu, R. Li, PSA: a photon search algorithm, J. Inf. Process. Syst. 16 (2020) 478–493.
- [462] (KSO) R. Dong, S. Wang, New optimization algorithm inspired by kernel tricks for the economic emission dispatch problem with valve point, IEEE Access. 8 (2020) 16584–16594.
- [463] (SSA) R.K. Misra, D. Singh, A. Kumar, Spherical search algorithm: A metaheuristic for bound-constrained optimization, in: Indo-French Semin. Optim. Var. Anal. Appl., Springer, 2020: pp. 421–441.
- [464] (TDSD) X. Li, Z. Cai, Y. Wang, Y. Todo, J. Cheng, S. Gao, TDSD: A new evolutionary algorithm based on triple distinct search dynamics, IEEE Access. 8 (2020) 76752–76764.
- [465] (CGO) S. Talatahari, M. Azizi, Chaos Game Optimization: a novel metaheuristic algorithm, Artif. Intell. Rev. 54 (2021) 917–1004.
- [466] (CSA) M.S. Braik, Chameleon Swarm Algorithm: A bio-inspired optimizer for solving engineering design problems, Expert Syst. Appl. 174 (2021) 114685.
- [467] (AOS) M. Azizi, Atomic orbital search: A novel metaheuristic algorithm, Appl. Math. Model. 93 (2021) 657–683.
- [468] (JS) J.-S. Chou, D.-N. Truong, A novel metaheuristic optimizer inspired by behavior of jellyfish in ocean, Appl. Math. Comput. 389 (2021). https://doi.org/10.1016/j.amc.2020.125535.
- [469] (CSA) Z. Feng, W. Niu, Hybrid artificial neural network and cooperation search algorithm for nonlinear river flow time series forecasting in humid and semi-humid regions, Knowledge-Based Syst. 211 (2021) 106580.
- [470] (MGA) S. Talatahari, M. Azizi, A.H. Gandomi, Material Generation Algorithm: A Novel Metaheuristic Algorithm for Optimization of Engineering Problems, Processes. 9 (2021) 859.
- [471] (CryStAl) S. Talatahari, M. Azizi, M. Tolouei, B. Talatahari, P. Sareh, Crystal Structure Algorithm (CryStAl): A Metaheuristic Optimization Method, IEEE Access. 9 (2021) 71244-71261.

- [472] (AOA) F.A. Hashim, K. Hussain, E.H. Houssein, M.S. Mabrouk, W. Al-Atabany, Archimedes optimization algorithm: a new metaheuristic algorithm for solving optimization problems, Appl. Intell. (2020). https://doi.org/10.1007/s10489-020-01893-z.
- [473] (AHO) F. Zitouni, S. Harous, A. Belkeram, L.E.B. Hammou, The Archerfish Hunting Optimizer: a novel metaheuristic algorithm for global optimization, ArXiv Prepr. ArXiv2102.02134. (2021).
- [474] (BRO) T. Rahkar Farshi, Battle royale optimization algorithm, Neural Comput. Appl. 33 (2021) 1139–1157.
- [475] (ALSO) N. Kumar, N. Singh, D.P. Vidyarthi, Artificial lizard search optimization (ALSO): a novel nature-inspired meta-heuristic algorithm, Soft Comput. 25 (2021) 6179–6201.
- [476] (QFA) F. Zitouni, S. Harous, R. Maamri, A Novel Quantum Firefly Algorithm for Global Optimization, Arab. J. Sci. Eng. (2021) 1–19.
- [477] (FDA) H. Karami, M.V. Anaraki, S. Farzin, S. Mirjalili, Flow Direction Algorithm (FDA): A Novel Optimization Approach for Solving Optimization Problems, Comput. Ind. Eng. 156 (2021) 107224.
- [478] (LA) J.L.J. Pereira, M.B. Francisco, C.A. Diniz, G.A. Oliver, S.S. Cunha Jr, G.F. Gomes, Lichtenberg algorithm: A novel hybrid physics-based meta-heuristic for global optimization, Expert Syst. Appl. 170 (2021) 114522.
- [479] (POA) I.M. Abdullahi, M.B. Mu'azu, O.M. Olaniyi, J. Agajo, Pastoralist Optimization Algorithm (POA): A Culture-Inspired Metaheuristic for Uncapacitated Facility Location Problem (UFLP), (2021).
- [480] (EOSA) O.N. Oyelade, A.E. Ezugwu, Ebola Optimization Search Algorithm (EOSA): A new metaheuristic algorithm based on the propagation model of Ebola virus disease, ArXiv Prepr. ArXiv2106.01416. (2021).
- [481] (ECO) M. Jafari, E. Salajegheh, J. Salajegheh, Elephant clan optimization: a nature-inspired metaheuristic algorithm for the optimal design of structures, Appl. Soft Comput. 113 (2021) 107892.
- [482] (RCM) W.J. AL-kubaisy, M. Yousif, B. Al-Khateeb, M. Mahmood, D.-N. Le, The Red Colobuses Monkey: A New Nature–Inspired Metaheuristic Optimization Algorithm, Int. J. Comput. Intell. Syst. 14 (2021) 1108–1118.
- [483] (GEO) A. Mohammadi-Balani, M.D. Nayeri, A. Azar, M. Taghizadeh-Yazdi, Golden eagle optimizer: A nature-inspired metaheuristic algorithm, Comput. Ind. Eng. 152 (2021) 107050.
- [484] (GMBO) M. Dehghani, Z. Montazeri, Š. Hubálovský, GMBO: Group Mean-Based Optimizer for Solving Various Optimization Problems, Mathematics. 9 (2021) 1190.
- [485] (DO) A.K. Bairwa, S. Joshi, D. Singh, Dingo Optimizer: A Nature-Inspired Metaheuristic Approach for Engineering Problems, Math. Probl. Eng. 2021 (2021).
- [486] (CHIO) M.A. Al-Betar, Z.A.A. Alyasseri, M.A. Awadallah, I.A. Doush, Coronavirus herd immunity optimizer (CHIO), Neural Comput. Appl. 33 (2021) 5011–5042.
- [487] (RFO) D. Połap, M. Woźniak, Red fox optimization algorithm, Expert Syst. Appl. 166 (2021) 114107.
- [488] (AOA) L. Abualigah, A. Diabat, S. Mirjalili, M. Abd Elaziz, A.H. Gandomi, The arithmetic optimization algorithm, Comput. Methods Appl. Mech. Eng. 376 (2021) 113609.
- [489] (AVOA) B. Abdollahzadeh, F.S. Gharehchopogh, S. Mirjalili, African vultures optimization algorithm: A new nature-inspired metaheuristic algorithm for global optimization problems,

- Comput. Ind. Eng. 158 (2021) 107408.
- [490] (GTO) B. Abdollahzadeh, F. Soleimanian Gharehchopogh, S. Mirjalili, Artificial gorilla troops optimizer: A new nature-inspired metaheuristic algorithm for global optimization problems, Int. J. Intell. Syst. 36 (2021) 5887–5958.
- [491] (AHA) W. Zhao, L. Wang, S. Mirjalili, Artificial hummingbird algorithm: A new bio-inspired optimizer with its engineering applications, Comput. Methods Appl. Mech. Eng. 388 (2022) 114194.
- [492] (IIFA) A. Karpenko, I. Kuzmina, Meta-Heuristic Algorithm for the Global Optimization: Intelligent Ice Fishing Algorithm, in: Inven. Syst. Control, Springer, 2021: pp. 147–160.
- [493] (KMA) S. Suyanto, A.A. Ariyanto, A.F. Ariyanto, Komodo Mlipir Algorithm, Appl. Soft Comput. (2021) 108043.
- [494] (LPE) C. Gao, Z. Hu, W. Tong, Linear prediction evolution algorithm: a simplest evolutionary optimizer, Memetic Comput. 13 (2021) 319–339.
- [495] (MOTR) Y. Masoudi-Sobhanzadeh, B. Jafari, S. Parvizpour, M.M. Pourseif, Y. Omidi, A novel multi-objective metaheuristic algorithm for protein-peptide docking and benchmarking on the LEADS-PEP dataset, Comput. Biol. Med. 138 (2021) 104896.
- [496] (OSPO) J. Xu, L. Xu, Optimal Stochastic Process Optimizer: A New Metaheuristic Algorithm With Adaptive Exploration-Exploitation Property, IEEE Access. 9 (2021) 108640–108664.
- [497] (ROA) H. Jia, X. Peng, C. Lang, Remora optimization algorithm, Expert Syst. Appl. 185 (2021) 115665.
- [498] (RTGBO) S.A. Doumari, H. Givi, M. Dehghani, O.P. Malik, Ring Toss Game-Based Optimization Algorithm for Solving Various Optimization Problems, Int. J. Intell. Eng. Syst. 14 (2021) 545–554.
- [499] (RUN) I. Ahmadianfar, A.A. Heidari, A.H. Gandomi, X. Chu, H. Chen, RUN beyond the metaphor: an efficient optimization algorithm based on Runge Kutta method, Expert Syst. Appl. 181 (2021) 115079.
- [500] (SaMW) D. Tychalas, H. Karatza, SaMW: a probabilistic meta-heuristic algorithm for job scheduling in heterogeneous distributed systems powered by microservices, Cluster Comput. 24 (2021) 1735–1759.
- [501] (STA) L. Rodriguez, O. Castillo, M. Garcia, J. Soria, A new meta-heuristic optimization algorithm based on a paradigm from physics: string theory, J. Intell. Fuzzy Syst. 41 (2021) 1657–1675.
- [502] (SHIO) H.N. Fakhouri, F. Hamad, A. Alawamrah, Success history intelligent optimizer, J. Supercomput. (2021) 1–42.
- [503] (TSA) A. Layeb, The Tangent Search Algorithm for Solving Optimization Problems, ArXiv Prepr. ArXiv2104.02559. (2021).
- [504] (TSO) L. Xie, T. Han, H. Zhou, Z.-R. Zhang, B. Han, A. Tang, Tuna swarm optimization: a novel swarm-based metaheuristic algorithm for global optimization, Comput. Intell. Neurosci. 2021 (2021).
- [505] (VCA) E. Hosseini, A.S. Sadiq, K.Z. Ghafoor, D.B. Rawat, M. Saif, X. Yang, Volcano eruption algorithm for solving optimization problems, Neural Comput. Appl. 33 (2021) 2321–2337.
- [506] (SFOA) D. Sattar, R. Salim, A smart metaheuristic algorithm for solving engineering problems, Eng. Comput. 37 (2021) 2389–2417.
- [507] (AFT) M. Braik, M.H. Ryalat, H. Al-Zoubi, A novel meta-heuristic algorithm for solving

- numerical optimization problems: Ali Baba and the forty thieves, Neural Comput. Appl. 34 (2022) 409–455.
- [508] (HBA) F.A. Hashim, E.H. Houssein, K. Hussain, M.S. Mabrouk, W. Al-Atabany, Honey Badger Algorithm: New metaheuristic algorithm for solving optimization problems, Math. Comput. Simul. 192 (2022) 84–110.
- [509] (OPA) Y. Jiang, Q. Wu, S. Zhu, L. Zhang, Orca predation algorithm: A novel bio-inspired algorithm for global optimization problems, Expert Syst. Appl. 188 (2022) 116026.
- [510] (RSA) L. Abualigah, M. Abd Elaziz, P. Sumari, Z.W. Geem, A.H. Gandomi, Reptile Search Algorithm (RSA): A nature-inspired meta-heuristic optimizer, Expert Syst. Appl. 191 (2022) 116158.
- [511] (SSSA) N.B. Arunekumar, K.S. Joseph, Skip Salp Swam Algorithm for Feature Selection, in: Inf. Commun. Technol. Compet. Strateg. (ICTCS 2020), Springer, 2022: pp. 231–240.